The Chemical Age

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Notes and Comments

Imperial Chemical Dividend

ONE of the most welcome signs of the improving condition of the chemical industry was the announcement last week-end by the directors of Imperial Chemical Industries, Ltd., of an interim dividend of $2\frac{1}{2}$ per cent., against $1\frac{1}{2}$ per cent. at the same time last year. This announcement substantiates the statements which Sir Harry McGowan, chairman of the company, has made from time to time since the beginning of the present year, that the industry is turning the corner. Throughout the first eight months of 1932 the chemical industry has been doing distinctly better than even in the last quarter of 1931. For that quarter the Board of Trade index of production for the chemical industry was 92.8, from which it rose to 103.2 for the March quarter of this year and 103.8 for the June quarter. The industry's customers in general have made greater demands, but in particular the rayon industry and the dyeing industry have been more active. There has, moreover, been a reduction of imports, to widen the home market, while, as a result of the devaluated pound, exports have not only been maintained, but even slightly increased from £10,487,000 for the first seven months of 1931 to £10,564,000 for the same period of this year. Employment, too, has been at rather a better level than in 1931. Beyond this general improvement, the I.C.I. has had particular success with certain new specialities—in particular its product "Drikold"—while the decline in the price of some standard products, such as sulphate of ammonia and sulphate of copper, has been compensated by advances in many smaller chemicals.

The Copenhagen Exhibition

SCANDINAVIAN visitors, and particularly representatives of Denmark, were strongly in evidence in the chemical industry section of the British Industries Fair held at Olympia last February, and more than passing interest therefore attaches to the British Trade Exhibition to be opened at Copenhagen on Saturday, September 24, from the chemical industry's point of view. This exhibition is a manifestation of a desire on the part both of the Danish Government and the Danish commercial world to enter into closer trade relations with Great Britain. The Prince of Wales and the Crown Prince of Denmark are patrons of the exhibition, which has been accorded a hearty reception by the authorities, and the British Import Union, which was started three years ago by a number of Danish business men with British interests, is hopeful that it will be productive of good results.

Denmark has to rely to a great extent upon Great Britain for its overseas trade. Great Britain buys something like 60 per cent. of its exports, and it purchases largely those products for which it has no other market. On the other hand, Denmark has in the past only purchased a small percentage of its imports from Great Britain, and the exhibition will therefore be an important factor in establishing closer business relations. The Danish Government has already taken steps to ensure that for all orders taken at the exhibition, import licences will be issued and currency certificates will be forthcoming, automatically. A comparison of the figures for the first eight months of 1931 with those of a similar period for 1932 is instructive. Notwithstanding the fact that total Danish imports have decreased by 20 per cent., Danish imports of British goods have increased by no less than $12\frac{1}{2}$ per cent. In 1931, British imports into Denmark were 13.6 per cent. of the total, while Germany did 28 per cent. In 1932, Britain's figure had risen to 25.2 per cent. of the total and Germany's had decreased to 13.9 per cent.; so that whereas in 1931 we supplied only one-eighth of Denmark's imports, in 1932 we have supplied a quarter. There is still room for a very considerable increase in these figures.

An All-British Display

ALL exhibits at Copenhagen will be the products of or manufactured in Great Britain and Northern Ireland, the Dominions, Colonies or Dependencies. According to a special British Exhibition number of the "Financial News," the arrangements for the reception of visitors have already been well organised. A bureau will be opened at the railway station, where full details of all available accommodation for each day will be on record; and it is understood that steps have been taken to discourage profiteering and to ensure that only normal prices are charged. Special travelling facilities have been arranged. The United Shipping Co., in conjunction with the L.N.E.R. and the Danish State Railways, are issuing through tickets from London to Copenhagen at about 25 per cent. below ordinary rates. To those who prefer air travel, the Royal Dutch Air Lines offer considerable reductions to travellers by the Scandinavian Air Express, and the Finnish Line are offering attractive rates from Hull to Copenhagen. In every direction the omens are favourable. There is every inducement to the British manufacturer to visit and establish friendly relations with his customers, and there is the very evident goodwill of the customer to consolidate and capitalise. It only remains for the British manufacturer to show that he is willing to produce goods suitable to the Danish market.

Sir Ernest Benn, chairman of Benn Brothers, Ltd., accompanied by Lady Benn, is attending the opening ceremony, as well as Mr. Crole-Rees, managing director, and Bouverie House will be well represented in the exhibition. THE CHEMICAL AGE and other trade and technical journals issued from Bouverie House will be specially displayed in the pavilion of the "Berlingske Tidende," the leading Danish daily paper.

Tung Oil Developments

IN other pages of this issue we devote considerable space to a review of the industrial applications of tung oil, which in recent years has come into prominence throughout the world as an essential raw material. Tung oil is characteristic of the many important raw materials contributed by the East to the industries of the West. Employed crudely for centuries by the Chinese for various purposes which did not take full advantage of its valuable properties, it was brought within a relatively short space of time to a position of prominence in international commerce by the vision, capital and enterprise of the western world. Venturesome spice traders first introduced tung oil into European markets during the sixteenth century, but the first appreciable shipment to the United States in 1869 marked the beginning of a substantial world trade.

Chemists and industrial technicians have eliminated many of the difficulties involved in handling the oil and have materially assisted in demonstrating the distinctive usefulness of the product. Progress in the establishment of a domestic tung oil industry has been most pronounced in America, where there has been a considerable extension of tung tree acreage in recent years, particularly in Florida and Mississipi. Domestic production of the oil, commenced on a small scale with the establishment of a modern tung oil mill in the south in 1928, has been gradually increasing and has been restricted only by the extent of bearing acreage and the rather general employment of nut yields for further plantings. The first shipment of a full tank car containing 65,000 lb. of domestic tung oil to consuming channels in the spring of this year was a promising demonstration of the excellent prospect of developing commercial production of the oil during the coming years. The superior quality claimed for tung oil produced by machine expression will give domestic supplies of the oil an advantage in ultimately competing with imports from China.

Chemical Markets in Ecuador

ALTHOUGH Ecuadorean druggists manufacture on a small scale certain medical preparations of simple formula, and a very limited quantity of perfumery and toilet articles, almost the entire consumption is met by imported goods, and the total imports under this heading form a large item of Ecuadorean imports, occupying the fourth place. The imports of drugs and chemicals are considerably larger than would have been expected for a small population such as that of Ecuador, especially if due consideration is given to the fact that the Indian classes consume mostly herbal preparations of their own. This may be brought about by the general inclination of local doctors to prescribe medicines in large quantities. The chief demand is for patent medicines, and chemicals for pharmaceutical purposes. There is only a limited demand for industrial chemicals which are almost exclusively consumed by the textile factories established in Quito and other inland towns, a small proportion being also taken by the few local soap factories.

Due to the depressed economic conditions in Ecuador during the last two years, and to the abandonment of free trade with Colombia—previously the consumer of about 50 per cent. of Ecuadorean manufactures—the output of goods by Ecuadorean mills has been reduced to a minimum, which has caused a proportionate decrease in the demand for industrial chemicals. The total imports in 1930 under this heading which includes pigments, paints, inks, dyes, perfumery, toilet preparations and drugs and chemicals amount to £219,565, representing 8 per cent. of the total imports into Ecuador. If comparison be made with the year 1929, imports under this heading show a decline of over £20,000 against 1930. The actual imports in 1930 under the sub-heading of pharmaceutical products, patents medicines and chemical products used in medicine and industry are £130,566, and under perfumery and toilet preparations £57,207.

Overseas Chemical Trade

THE principal features of the Board of Trade returns for August, issued this week, are a comparatively slight decrease in total exports and a heavy drop in total imports as compared with last year. The total value of imports in August amounted to £53,312,814, against £65,281,043 for the corresponding month of last year, a decrease of £11,968,229. Total exports were valued at £32,043,245, compared with £32,986,969 in August, 1931. So far as the chemical industry is concerned, the comparisons with last year's figures were even more favourable than those for the aggregate overseas trade. Chemical imports amounted to £824,779, against £749,616 in July of this year and £1,058,011 in August of last year, a decrease on the year of £233,232. Chemical exports reached a total of £1,433,328 in August, against £1,445,804 in July and £1,117,125 for August, 1931, an increase of £316,203. In previous years, exports have fallen considerably in August compared with July, but the past month has shown no such movement, the aggregate decrease on the month being only £555,200, while the fall in chemical exports was only £12,476.

Other trades showing a welcome increase in exports during August were iron and steel, which registered an increase of £75,601, non-ferrous metals, £74,871, and cutlery, hardware, cotton manufactures, woollen goods and other textiles. For eight months of 1932 to date, our exports of chemicals, drugs, dyes and colours amount to £11,996,541, which is £391,770 higher than for the corresponding eight months of last year. Britain's adverse balance of trade with the world amounted for the first eight months of this year to £184,938,239. This shows a substantial reduction from the corresponding period of 1931, when the figure was £246,055,400. It is of interest to compare the present position with that of twelve months ago. In THE CHEMICAL AGE of September 19, 1931, we reported a decline of £398,653, or 26.3 per cent. in the exports of chemicals in August, 1931, compared with those of the previous year.

The Institute of Metals

Joint Annual Autumn Meeting with Iron and Steel Institute

THE twenty-fourth annual autumn meeting of the Institute of Metals was held in London jointly with the autumn meeting of the Iron and Steel Institute, September 12 to 15. It was attended by more than 300 members of both Institutes from many parts of the world. The opening session on September 12 was devoted to a lecture by Dr. H. J. Gough, of the National Physical Laboratory, on "Corrosion-Fatigue of Metals." On September 13 a joint session of the two Institutes took place at the Institution of Civil Engineers, when five papers were read. Eleven more communications were presented at separate sessions—in the afternoon, whilst a conversazione took place in the evening. Held at the Science Museum, South Kensington, the latter gathering was notable for an unique display of scientific talking films. The final business sessions of the meeting took place in the morning of September 14, when eleven papers were read and discussed, the afternoon being devoted to visits to works and research laboratories.

Corrosion-Fatigue of Metals

In the autumn lecture, delivered at the Institution of Mechanical Engineers on September 12, Dr. H. J. Gough pointed out that corrosion-fatigue of metals is defined as the behaviour of metals subjected to cyclical stresses while exposed to an environment of an oxidising nature. Following a brief historical account, the nature of the general problem, the nomenclature employed, and the characteristics of laboratory tests, consideration was given to the general influences of chemical composition, heat-treatment, and cold-working on the resistance of metals to corrosion-fatigue, also of the effect of time, number of cycles, and corrosivity of environment as factors in the process. The available knowledge regarding the special case of corrosion-fatigue in steam was discussed, as well as the general characteristics of corrosion accelerators and inhibitors. It was shown that a recognition of the importance of oxygen as a factor in fatigue renders entirely reconcilable the results of many apparently unrelated observations which have been obtained in independent researches. Some fundamental facts regarding the nature of corrosion-fatigue can be deduced from observations of the changes of micro-structure occurring under these conditions, whilst primary importance is attached to the behaviour of protective films under the straining actions associated with cyclical stressing. Although a large field of research remains to be explored, yet, even at the present time, it is concluded that the mechanism of corrosion-fatigue can be reduced to an ordered sequence of chemical and physical events which are explicable in the light of existing knowledge relating to corrosion and fatigue phenomena.

Liberation of Gases from Metals

The effect of pressure on the liberation of gases from metals (with special reference to silver and oxygen) was the subject of a paper by N. P. Allen, who studied the liberation of oxygen from silver during solidification by means of cooling curves. It has been found that the gas is evolved when the "internal pressure" of the dissolved gas becomes greater than the hydrostatic pressure of the liquid metal, and that by applying a sufficiently large pressure to the liquid metal, the formation of blow-holes can be prevented. A method of eliminating blowholes in cast metals was recommended by the author, who also discussed the "internal gas pressures" developed in metals when gaseous constituents capable of interaction are present

Non-Ferrous Casting

Mould materials for non-ferrous strip ingot casting was dealt with by G. L. Bailey in the form of a communication from the Research Department, Woolwich. Grey cast-iron is the material most generally used for moulds for the casting of non-ferrous strip ingots. Cast-iron moulds, however, are subject to two particular defects: (a) gas evolution or "blowing" from the face of the mould when this is overheated during pouring, and (b) transverse cracking of the working faces. The conditions producing "blowing" have been studied and it has been found that the gas has been found to originate in a reaction between the carbon of the iron and a superficial oxide film. Transverse cracking of the cast-iron mould surface, it was pointed out, is due to stresses resulting from a high temperature gradient in the mould wall immediately after casting. Mild steel moulds, which are free from "blowing" and cracking, are liable to serious distortion resulting from such stresses. Copper is considered the most satisfactory material for strip ingot moulds. Its high thermal conductivity prevents serious temperature gradients and consequent distortion. For high melting-point materials copper moulds are water-cooled with advantage, but for alloys such as brass they can be used under certain conditions without any special cooling.

Copper at High Temperature

Certain properties of five typical commercial varieties of copper, have been investigated at elevated temperatures, were reported by T. G. Bamford. It was shown that although there is a decline in resistance to alternating stresses at 200° to 300° C., there is no brittle range of temperature in copper. Of the varieties tested deoxidised nickel-copper had the best resistance to alternating stresses and had exceptionally good properties in this respect at 360° C.

Grain Growth in Alpha Brass

The effect of different elements on the annealing and grain-growth characteristics of alpha brass was described by Maurice Cook and Herbert J. Miller. According to this paper an examination has been made of the effect of additions of iron, phosphorus, manganese and aluminium separately and of aluminium with nickel, and aluminium with silicon, on the annealing characteristics of alpha brass by determining diamond pyramid hardness values and making grain size measurements on cold-rolled alloys annealed at various temperatures, while the tensile properties on a number of alloys representative of the various series investigated have also been studied. Some of the elements added have the effect of increasing the intrinsic hardness of brass and of raising the temperature of softening and recrystallisation, but all exert retarding influence on the annealing process subsequent to the initial softening, the extent of which varies with the nature and amount of the addition. This retarding influence, which markedly affects grain growth as well as the physical properties, was shown as a deflection on curves connecting hardness values and tensile properties with annealing temperature.

Impingement Corrosion Experiments

A modified impingement corrosion apparatus for carrying out impingement corrosion experiments was described by H. W. Brownsdon and L. C. Bannister, who pointed out that it is frequently necessary to be able to predict, within fairly wide limits, the probable corrosion-resistance of any material to service conditions in order to gauge approximately its life, the safety margin in constructional dimensions, and any precautions to be taken during use.

Hot-Dipping Processes

Some reactions occurring in "hot-dipping" proceses were reported by Edward J. Daniels, who has investigated the part played by fluxes and has found a general agreement with diverse processes. The contamination of the liquid metal—"drossing"—was shown to be an inevitable factor in hot-dipping, soldering, etc., and methods for controlling it were indicated. The coating of steel with cadmium and lead by hot-dipping was shown to be accomplished by the formation of the compounds $FeCd_2$ and $FePb_2$, which act as insulating layers preventing further attack. These compounds rise to the surface of the liquid bath, have high melting points and are magnetic.

Atmospheric Action and Fatigue

According to H. J. Gough and D. G. Sopwith, in their joint paper on atmospheric action as a factor in fatigue of metals, a review of the literature of corrosion-fatigue reveals many apparent inconsistencies, but a closer examination indicates

that such is not the case if it can be shown directly that atmospheric corrosion enters, to a varied extent, into the mechanism of fatigue as exhibited during the usual type of fatigue test in which the surface of the specimen is exposed freely to the atmosphere. In order to obtain this direct evidence, a lengthy series of comparative tests were made in air and in a partial vacuum, on a range of ferrous and non-ferrous metals and alloys. The results showed definitely that the fatigue strength is, in general, improved by the substitution of a vacuum for air as the ambient condition. Various metals are affected to various extents, the maximum improvement obtained, in the tests, representing an increase of 26 per cent. in the case of 70 : 30 brass.

Removal of Gases from Aluminium Alloys

Dealing with the removal of gases from aluminium alloys by mixtures of nitrogen and volatile chlorides, J. D. Grogan and T. H. Schofield described an investigation carried out under the direction of the Alloys Sub-Committee of the Aeronautical Research Committee for the Department of Scientific and Industrial Research, which essentially constitutes a continuation of the systematic study of aluminium and its alloys, which has long been carried on in the Metallurgy Department of the National Physical Laboratory. It was stated that raw cylinder nitrogen may be employed, the quantity of chloride needed being small. Metal treated in this way possesses excellent mechanical properties.

Beryllium-Magnesium Alloys

Some attempts at making beryllium-magnesium alloys were reported by Ronald J. M. Payne and John L. Haughton. Owing to the low densities of magnesium and beryllium, and to the remarkable results obtained by the addition of the latter element to copper, various workers have tried to produce alloys of beryllium and magnesium, but so far as the authors have been able to find, without success. The high melting point of beryllium and the low melting point of magnesium preclude the melting together of the metals, at any rate under normal pressures, and no action appears to take place between solid beryllium and molten magnesium. It was thought possible, however, that if molten beryllium were poured into molten magnesium, the intimate contact of the two metals obtained might result in the formation of an alloy on subsequent annealing of the mixture Some beryllium was therefore melted *in vacuo* in a high-frequency furnace and poured into a pot of molten magnesium, and the mixture was well stirred and quickly cast into a steel mould. A portion of the material thus obtained was prepared for microscopic examination, which revealed the beryllium, in the form of small lumps possessing clear-cut edges, irregularly distributed throughout the magnesium. A piece of the casting was then annealed at a temperature of 600° C. for a period of 7 days, and although there were some slight indications of attack at the boundaries of the included beryllium, the mixture was in sensibly the same condition as that which obtained before annealing.

Constitution of Lead-Tin Alloys

An investigation of the constitution of the lead-tin alloys was described by D. Stockdale. The micrographic method, two thermal methods, and a modified electrical conductivity method were used in the determination of the solubility of tin in lead, which was shown to be 19.5 per cent. by weight, at the temperature of the eutectic. This value is considerably higher than any other previously obtained. It was also shown that at ordinary temperatures lead probably cannot hold more than 2 per cent. of tin in solid solution. The cause of the evolution of heat in certain of the alloys at a temperature just below that of the eutecic was also discussed.

Artificial Production of Patina

The artificial production of green patina on copper was the subject of a paper by W. H. J. Vernon. Following on the observation that the " natural " green patina on copper consists normally of basic copper sulphate, methods were worked out for the rapid production of an artificial patina of this substance. Treatment with ammonium sulphate solution followed by a solution in which basic copper sulphate is suspended gave a green patina, which breaks down under severe weather conditions. A patina stable under the latter conditions is produced by anodic treatment for 15 minutes in a suitable electrolyte; this has a good green colour and is quite insoluble in water. The deposit on leaving the bath has a composition represented by the formula $CuSO_4.Cu(OH)_2$; on exposure to the open air a progressive increase in basicity takes place, leading ultimately, it is believed, to the formula $CuSO_4.3Cu(OH)_2$. Certain synthetic coatings other than basic copper sulphate, although initially green, readily blacken on free exposure to town air. The application of linseed oil and more especially of lanoline to the primary coating gives marked protection to the underlying metal but does not prevent discolouration; water glass and silicon ester, on the other hand, appreciably increase the corrosion.

Inverse Segregation

Further investigations on the behaviour of silver-copper alloys in regard to the segregation of their constituents during solidification, which is usually referred to as " liquation " or " inverse segregation," were reported by J. H. Watson. It has been established that the first formed primaries, whether of silver or of copper, are free to move under the influence of gravity, when the alloy is maintained for sufficient time at temperatures between the " liquidus " and the " solidus." It has also been established that the primaries which have segregated under the influence of gravity are repelled from their position by the application of severe local chilling to their vicinity. All the effects of " liquation " and " inverse segregation " observed in these alloys in ordinary practice can be explained by the formation of primaries at the chilling surfaces of moulds and between the temperatures corresponding with the "liquidus " and the " solidus," followed by their immediate migration towards the hotter portions of the mass.

Researches on beryllium, which was the subject of a paper by H. A. Sloman, will be dealt with in a subsequent issue of THE CHEMICAL AGE.

National Research Council

Official Opening of New Laboratories at Ottawa

THE new National Research Laboratories at Ottawa have been formally opened, official ceremonies taking place on August 10. The laboratories have been built on a ten-acre site overlooking the Ottawa River about a mile east of the Parliament Buildings and were erected by the Canadian Government at a cost of approximately $3,000,000. The new laboratories will house the activities of the National Research Council of Canada, an organisation dating back to 1916, when it was known as the Honorary Advisory Council for Scientific and Industrial Research. Hitherto the Council has been without permanent laboratory quarters to carry on the problems of national research.

The Council has been provided with a main building, in classic architecture suitable to the capital of Canada, containing approximately 4,000,000 cu. ft. of space. The principal building is of four storeys and dimensions 418 ft. by 176 ft. A separate power house has been built in similar style to the main building. Two of the principal units are the heavy testing laboratory and the electrical laboratory, both two storeys in height and equipped with travelling cranes of 15 tons capacity. In addition to the numerous laboratories a feature of the new home of the research organisation is a library with accommodation for 300,000 volumes.

World Potash Production in 1931

INTERESTING figures relating to the position of the world's potash industry were given by Dr. Zirkler at the recent general meeting of the Kaliwerke Aschersleben. Calculated in terms of pure potash (K_2O), the total production of potash salts last year was 1,457,000 metric tons, compared with 2,018,000 tons in 1930 and 2,118,000 tons in 1929. German production fell from 1,357,000 tons in 1930 to 964,000 tons in 1931, while the estimated output for this year is in the neighbourhood of 850,000 tons. In 1930 France produced 500,000 tons, but this figure declined to 350,000 tons last year, while Polish production in 1931 reached 30,000 tons, the United States output was 60,000 tons, and the Russian 18,000 tons.

A Wider Use for Silica Gel

Dehydration Problems and Air Conditioning

Processes of solvent recovery by use of silica gel were described in THE CHEMICAL AGE, June 25, 1932. This article summarises other applications of this colloid in industry.

THERE is no better example of commercial applications of colloidal chemistry, and more especially of the phenomenon of capillary attraction than the expansion in uses of colloidal silica. Although natural forms of almost pure silica are available, such as hyalite and geyserite, which give an analysis of 100 per cent. SiO_2 after calcination, yet only artificially prepared forms are suitable for modern industrial requirements owing to the lack of high absorptive capacities in the natural types. Some idea of the order of capilliary structure possessed by these artificial gels may be gathered from the estimation of Keetschau that the absorbent surface of one grain of gel approaches two and a half million sq. cm., while certain American gels are stated to reach the four million mark.

Preparation of Gels

Methods of manufacturing silica gels have been covered by a number of patents, all of which centre round the main theme of decomposing silicates with strong or weak mineral acids. Calcium silicate may be decomposed with hydrochloric acid, sodium silicate may be treated with hydrochloric, sulphuric or carbonic acids, while one patent stipulates the use of phenol for liberation of the hydrated silica. Crystalloids formed in the reactions may be separated by dialysis, and the colloidal residue is then purified by careful washing and finally dehydrated to the required value. It is this washing and dehydrating process which determines the efficiency of the product in absorption processes. Silica gel is marketed in hard glassy granules resembling clear quartz in appearance, and showing no evidence of its porous structure even under a high-power microscope. The term "gel" is applied to it in accordance with the terminology of modern physical chemistry, and does not signify any jelly-like substance, as was formerly associated with this term. Both size of granule and degree of hydration of the finished product are determined by the particular type of process to which the gel is to be applied. A common American form for dehydration purposes is sold in granules about the size of a split pea; for oil refining in Germany the individual particles are similar to rice grains; while in American oil refineries and in medicinal preparations fine powders passing a mesh of 200 to the inch are common forms.

Modern uses other than in solvent recovery may be considered under such heads as the dehydration and purification of gases, uses in air conditioning, as support for catalysts, in refrigeration, etc. In the treatment of gases and vapours silica gel has two great advantages in being chemically inert towards all agents other than hydrofluoric acid and strong alkalies and in being incombustible. Both small-scale and major industrial examples of its dehydrating powers are becoming prominent. An instance of the former is the silica gel air dryer, consisting of a perforated aluminium canister packed with the granules, which is used to maintain a dry atmosphere in the covering cases of chemical balances. Such a substitute in place of calcium chloride or sulphuric acid has the advantage of absence of dust and deterioration due to accidents, while economy is also effected since the gel may be re-activated by heating the canister in an air-oven for one hour.

Dehydration of Industrial Gases

On a large scale applications for dehydrating purposes have expanded with the demands for dry air, carbon dioxide, or other gases in commerce. When it is borne in mind that silica gel can absorb water vapour to an extent of over 40 per cent. of its own weight without appearing "moist," and that regeneration by direct heating or treatment with hot gas is attained with one hundred per cent. efficiency, the possibilities of use in this direction are seen to be very wide. The product of the Silica Gel Corporation has been employed with great success in drying blast furnace feed air at Wishaw, near Glasgow. All types of drying devices have been mooted in the iron and steel industry for maintaining the complete absence of moisture, or alternatively a low and constant moisture value, in blast furnace air. Calcium chloride, sulphuric acid, and the use of refrigerating devices have all been put to practical test, but have failed to solve the problem on an economical basis. By use of silica gel, however, the dehydration has been effected to the required degree of control, thus giving a decreased consumption of fuel and greater uniformity in the blast furnace product. In the "dry ice" and other carbon dioxide industries a number of plants involving silica gel absorbers have been put into operations; both the complete dehydration of the gas and the elimination of certain odorous impurities being effected. Silica gel enjoys the further advantage in its suitability for installing at any point over the entire pressure range of the carbon dioxide plant, and in the fact that no freezing troubles are encountered even when working 40° F. below zero.

Both hydrogen and oxygen are dried at the works of the Norsk Hydro Electrisk at Vemock, Norway, by use of silica gel units. A typical plant for this type of use consists firstly of a silica gel trap below the moist compressed gas inlet, followed by two absorbers of the pressure type connected in parallel between the compressor condensate receiver and the cylinder charging main. The valves of the first absorber are opened until the column of gel becomes saturated, when the gas line is diverted to the second absorber, while the first one is re-activated by a current of hot air. After allowing the gel to cool, the first absorber is ready for renewed use. For obtaining the hot air current an electric heater and a motor blower are installed, while for speeding up the cooling of absorbers after re-activation a cooling blower may also be included. For cases in which a twenty-four hour service is not required a single absorbing unit may suffice. The drying of acetylene is becoming more common than hitherto, especially when storage in acetone is to follow manufacture; for a moist gas causes losses in solvent, since acetone and water are miscible, and when the drying process includes purification of the gas at the same time the advantages are obvious.

Air Conditioning

Allied to the processes of dehydrating gases is the problem of air conditioning; and in cases where either complete absence of moisture or a low but constant humidity value is desired, silica gel has been applied with success. An example is in the manufacture of telephone toll cables at the works of the Northern Electric Co. at Montreal. Complete dryness of the paper insulation of cables is a vital factor in determining the "voice carrying current quality," and this dryness has been attained by maintaining a dry air supply rather than by use of heated air. A preliminary filter removes dust from the air stream, and silica gel absorbers are used for removal of humidity before the air passes through grill openings into the storage chambers.

Silica gel is also highly efficient in a direction to be expected in the case of a highly porous substance, viz., in applications as catalyst and as support for other catalytic substances. In the sulphuric acid industry the gel has proved its value as a carrier for the platinum in converters. With the common forms of contact mass incorporating asbestos or magnesium sulphate the proportion of platinum required is from 10 to 12 troy ounces per ton of sulphuric acid per day; but with silica gel no more than 3 troy ounces are required, the difference being due to the superior surface effect given by the gel. An example in England is the sulphuric acid plant of the Chemical and Metallurgical Corporation at Runcorn.

Refining Coke-Oven Light Oils

Silica gel is the only adsorbent which rivals activated carbon in the recovery of volatile solvents in industries producing celluloid, rubber fabrics, etc. In a report of the

Joint Benzole Research Committee the efficiencies of the two adsorbents were stated to be approximately equal; for although a higher adsorptive capacity was found for carbon when calculated on weight, yet this is cancelled when the important factor of space occupied by adsorbers is taken into consideration. Such gels have also proved highly efficient in the refining of cracked gasoline and coke oven light oils. A high efficiency was found in the removal of sulphur in the high sulphur crude oils formerly on the market; and the gel has now proved equally advantageous in removing both the low sulphur content in modern oils and also the gum-forming unsaturated compounds in coke oven light oils. The method commonly used is to pass the acidified crude oil (0.2 to 0.4 per cent. sulphuric acid) under pressure through silica gel at 275° Fahrenheit. When the adsorption of gumming material has rendered the gel inactive it is removed from the refining unit and revivified. The Bethlehem Steel Co. and the Rochester Gas Co., of New York, have increased the fields of motor benzol by 12 to 15 per cent. by use of the silica gel process.

The Unique Characteristics of Tung Oil

A Review of its Present and Potential Uses

Tung oil has now assumed world-wide prominence as an essential raw material. This article is based upon a report recently issued by the United States Department of Commerce, which deals fully with the progress made towards the establishment of a tung oil industry in Florida, Mississippi, Louisiana and Texas.

As found in its natural state in the cells of the seeds, tung oil is practically colourless and neutral in reaction. The Chinese oil of commerce, however, is a yellow liquid at ordinary temperatures, containing up to 7 per cent. free acid and possessing a strong earthy odour. These changes in the physical properties of the oil may be attributed principally to crude methods of handling the nuts and producing the oil in China. Many improvements have been noted in the physical constants of tung oil produced by machine expression in the United States. A lighter colour has been attained, a lower acidity has been recorded, and the odour of the oil has been appreciably lessened.

Tung oil has a high viscosity and will gradually thicken and gelatinise upon constant exposure to light. The valuable distinctive features of this oil are the manner and rapidity with which it dries and the impermeability of the film which it forms upon drying. It dries largely by polymerisation, a spontaneous molecular transformation. This oil in heat-treated or varnish form produces a hard, quick-drying, waterproof film, highly resistant to acids and alkalies, and possessing in combination with phenolic resins marked dielectric properties. It is rarely used in a raw state, since the drying action of the oil is considerably accelerated and a much superior film is obtained by cooking or heat treament. In the raw state, frosted or opaque wrinkly films are formed. Careful formulation of heat treatment or cooking practices is also necessary in the preparation of tung oil because of its strong tendency to gelatinise into a worthless insoluble mass at temperatures above 450°F.

Chemical Composition

The chemical composition of tung oil differs somewhat from that of most other drying oils. The principal constituent of the oil is a glyceride of a fatty acid known as elæostearic acid, which appears, according to present knowledge, to be isomeric with linolenic acid. Elæostearic acid is formed by three double bonds, each connected by single bonds. This closely conjugated structure of the acid is said to be largely responsible for the polymerisation action and rapid-drying characteristics of the oil. Tung oil also contains about 10 per cent. of the glycerides of oleic acid and from 2 to 3 per cent. of the glycerides of saturated fatty acids (mainly palmitic and stearic). Conclusive work on the chemistry of tung oil has up to the present time been rather limited. However, the development of a more extended knowledge of the structure and composition through research may be instrumental in improving present methods of application and may thus serve to amplify the usefulness of the oil.

Material standards can not adequately measure the value of tung oil to industry. This commodity has gained particular prominnce as a constituent of coating and finishing products such as varnishes and enamels. Its distinctive properties have contributed greatly to the quality and efficiency of these products in their diversified fields of application. It has aided especially in the improvement of industrial finishes employed in the construction, furniture, automotive, electrical, textile, lithographic printing, specialised ink, household appliance, and speciality industries. The exceptional quick-drying properties of tung oil have definitely assisted in speeding up industrial-finish operations and maintenance and repair jobs, enabling a saving of many thousands of dollars in those fields annually. The preservative and waterproof qualities of the oil have also naturally added to the durability of finished products upon which it is employed, curtailing recoating and replacement costs.

Paint and Varnish

A number of difficulties were encountered in the early use of tung oil, for paint and varnish, chief of which was its tendency to gelatinise at relatively low temperatures, but as knowledge of the product developed, satisfactory methods of handling were evolved. Tung oil was initially used in varnish manufacture as a flux for some of the hard gums which were difficult to fuse without loss of colour. Later, its employment with rosin was found to produce a varnish having better resistant and waterproof properties than the then standard type derived from linseed oil and fossil gums. Grinding liquids prepared from a tung oil-rosin base were gradually developed for use in enamel manufacture.

The demand which has developed so rapidly since 1914 for quick-drying finishes to speed up industrial operations and commercial maintenance jobs has resulted in a greatly amplified use of tung oil in such products. Tung oil is now recognised as an essential and outstanding constituent of industrial varnishes both for general and specialised uses—a growing industry in the United States—and is gaining in importance as a component of rapid-drying vehicles for enamels and certain types of paints. The discovery and application of new synthetic gums in varnish formulation have added greatly to the efficiency and popularity of tung oil for those purposes.

The recession in the former standard applications for old-type varnishes has resulted in the more marked development of specialised industrial varnishes and the consequent more widespread use of tung oil as a varnish ingredient, since it appears to be better qualified than other drying oils to meet these new requirements in industrial coating and finishing. Tinware coating compositions, lithographic varnishes, insulating varnishes, and airplane finishes are but a few of the new applications in which the use of tung oil has proved particularly desirable. The more extensive use of tin containers for canned foodstuffs, cigarettes, spices, medicines, paints, and a great diversity of other products, as well as the growth of business in bottle caps, advertising plates and signs, has materially expanded the field of lithographic printing. Varnish is applied in some instances direct to the metal base, as well as on labels or as a finish coat after the inscription or design has been applied. High-grade varnishes having particular adhesion to metals are required. Such varnishes provide a satisfactory protective film for the label, and produce a very durable film capable of withstanding the stamping and molding process employed in the final preparation of the container. Tung oil varnishes are finding increasing use in lithographic printing, and a gradual expansion of consumption in this industry is anticipated.

Tung oil is employed to a considerable extent in the electrical industry, particularly as an ingredient in insulating varnishes. Trade comment indicates that tung-oil varnishes are well adapted to electrical use. They are more resistant to water and oil and produce a firmer and faster

drying film than do most other materials. The fact that tung oil dries largely by polymerisation rather than by oxidation has in this use proved particularly advantageous, since in the presence of a high-tension electrical field certain materials tend to disintegrate slowly and lose their insulating properties, whereas tung-oil compositions are not readily affected. Insulating varnishes for coil treatment, for coating cloth and other fibrous materials, for finishing insulated wire and metallic surfaces, and for use in many other electrical applications are made with tung oil as the principal drying oil constituent. Varnished tapes of various kinds for use in high-tension cables and in the winding of transformers are surfaced mainly with specially prepared asphaltic tung-oil varnishes.

Enamels, Paints and Lacquers

High-grade enamels are prepared by incorporating suitable pigments with quick-drying tung oil varnishes. Although the rapid-drying enamels were originally designed for and appeared to be most adapted to amateur painting, their use in industrial channels is gradually expanding. Both tung oil and tung oil varnishes have received attention as potential vehicles for oil paints for both exterior and interior use. Tung oil has been found by manufacturers of aluminium paint to be the most satisfactory general-purpose vehicle for their products. The elasticity of tung oil vehicles and their imperviousness to water, in conjunction with the waterproof nature of aluminium powder provide the qualities of a stable and serviceable paint of high protective value for exterior application which has stood up well on wood, iron, millboard, asbestos cement sheet, and a number of other bases. Tung oil in combination with gilsonite, asphalt, and other substances, is finding increasing employment in preservative compositions for ironwork, metal roofs, storage tanks, and sidings.

The invasion of nitrocellulose lacquers, into consumption channels formerly employing quick-drying varnishes and enamels has tended to curtail indirectly the use of tung oil in those industries. However, certain uses of tung oil have developed in conjunction with lacquers. In metal finishing, such as in automobile body work, tung oil has found some utility as a plasticiser for nitrocellulose lacquers, particularly in heat-treated form, in priming coats on copper and aluminium. It is claimed that tung oil adds greater adhesiveness to the lacquer on these materials. Tung oil has also found utility in varnishes used as wood-stain vehicles for employment with lacquer coatings on furniture and other articles of wood.

Tung oil is also used in the formulation of paint driers, which are usually metallic soaps of drying-oil organic acids, employed primarily as catalysts to speed up the drying time of paint and varnish products. In the manufacture of tungate driers it is claimed that cobalt is the most efficient and satisfactory metallic base, followed in order by iron, manganese, copper, chromium, lead and zinc. Tung oil has also been employed recently in the formulation of certain synthetic resins.

Textile Waterproofing

The principal application of tung oil in textile manufacture is in the branch of that industry concerned with protective coating of textiles. Its use is outstanding in the preparation and finishing of linoleum, felt-base floor covering, oilcloth, and artificial leather. According to available statistics, the consumption of other drying oils in linoleum and oilcloth manufacture seems to have expanded more rapidly than that of tung oil. Tung oil is generally heat-treated prior to use in the protective-coating industry. Generally speaking, the oil is not employed as an impregnating fluid but as a vehicle for other coating materials, principally in blends with other oils and in specially prepared coating varnishes. The blending of tung oil with linseed results in a product very suitable for application in this industry. Tung oil has advantageously replaced linseed oil only in printed felt-base composition finishes.

Tung oil has been used for many years in the Orient as a waterproofing agent for textiles. Its application in the United States for that purpose, however, is believed not to have advanced as rapidly as the product merits. The consumption of tung oil in combination with textiles, excluding its use in linoleum and oilcloth manufacture, amounted to only 17,000 pounds in 1929. The field of waterproofed textiles, includes bagging and packing cloth, wagon and horse covers, tents, awnings, tarpaulins, raincoats, hunters' and sportsmen's equipment, as well as seat covers and automobile tops. The introduction of rubberised cloth and chemically treated textiles has tended to restrict somewhat the use of tung oil in waterproofing textiles, and time and fashion have changed to some degree the character of the demand for these products. Nevertheless, the industry is becoming increasingly alert to new materials, and tung oil may find more extended application for such purposes. It is at present utilised in the manufacture of light-weight cloth for raincoats, and very recently in the preparation of patent waterproof wall coatings.

Use in Soap Manufacture

A survey of raw materials utilised in the American soap industry conducted by the Fats and Oils Division of the United States Department of Agriculture (the findings of which were published in 1919) shows that 118,000 lb. of tung oil were consumed for soap making in 1916 and 115,000 lb. in 1917. However, according to a compilation prepared by the Bureau of the Census, tung oil was not consumed by soap manufacturers in 1929. The use of tung oil during the war period was largely predicated upon the difficulty of obtaining adequate supplies of other soap oils. A leading American soap authority thinks it unlikely that tung oil will ever have an important place among raw materials for soap manufacture. Tung oil is not particularly satisfactory soap ingredient from a technological standpoint because of its excessive drying qualities, which result in the production of a soft, mushy soap, subject in many instances to rancidity. In addition, the price factor is of chief importance, as more satisfactory oils can be obtained at less cost. The use of tung oil would probably be limited to special soaps for leather dressing or automobile cleaning; but for such soaps corn oil and soybean oil are equally suitable.

Promising Field as Fish-net Preservative

The United States Bureau of Fisheries in an investigation of fish-net preservatives during 1931 conducted tests employing tung oil in varying combinations with copper oleate, coal tar, and toxic dye. Cotton nettings treated with tung-oil compounds maintained and in some instances increased their original tensile strength in periods of exposure in fresh, salt, and brackish waters for the duration of the tests lasting six months. On the other hand, nets treated with many other preservatives, some of which are in present use, manifested a tendency to weaken gradually upon exposure. While all features of its application are not desirable, tung oil has shown sufficient promise in this field to warrant further investigation by both private and governmental agencies.

The oldest and most important use of the oil in China is in combination with pomace residue, lime, and bamboo shavings to produce a material employed extensively in the calking of the great number of junks and other small craft found on the inland waters of the country. In addition to imparting a bright luster to the woodwork of the ship, the product serves to preserve and waterproof the treated surfaces.

Tung oil has been considered in the past as a possible waterproofing agent for concrete. In experiments with concrete waterproofing compound conducted during 1931 at the Bureau of Standards, tung oil proved to be the best transparent coating tested. Several concrete waterproofing compositions containing tung oil are now being marketed.

Tung oil is employed in the gaskets on steam pipes, pumps and engines, and as a waterproofing material for cartridge shells. In the interior of China the oil is used as an illuminant, but its application for this purpose is not particularly satisfactory, since it provides a very smoky, sooty flame. It has been reported that tung oil is used in leather dressings, but in the United States it is believed that it finds only a limited employment in special varnishes used for patent-leather finishes, or for the protection of leather belting, and in a few waterproofing applications on leather. Certain uses of tung oil on paper have been the subject of considerable investigation in recent months, and tests of this material in the production of a moisture-proof and grease-proof coating for bagging and carton stock are being made.

Zinc Pigments in Paint Manufacture

A Review of their Present Position and Future Prospects

The future of zinc pigments in paint manufacture was discussed at some length by Dr. C. D. Holley (Director of Paint Research, The Sherwin-Williams Co., Detroit, Michigan) in a paper read recently to the Toronto Paint and Varnish Production Club. The following points from Dr. Holley's address are taken from "Canadian Chemistry and Metallurgy," July, 1932.

THE basic consideration in the improvement of the commercially pure or 98 per cent. zinc oxide has centred around the question of particle size. If the zinc oxide pigment contains a considerable percentage of excessively fine particles, an abnormal reaction takes place with oil, particularly with the oil acids, forming zinc soaps to such an extent that the paint film undergoes an early disintegration. If the excessively fine particles are absent, the degree to which the zinc soaps form is greatly lessened, the zinc particles are packed considerably closer together, film stresses are reduced, and the service value of the paint is proportionately increased. One of the large zinc pigment producers has been rather successful in improving the wearing value of their 98 per cent. grade of zinc oxide. The Sherwin-Williams Co. has centred its efforts in this direction specifically on the leaded zinc pigments with, it is believed, at least equal success.

Importance of Particle Size

From the results of repeated exposure tests it appears certain that particle size—at least the elimination of the excessively fines—plays a very important part in determining the wearing value of paints containing zinc pigments. If this feature is properly controlled, a paint containing 30 to 40 per cent. zinc oxide will prove wholly satisfactory, provided that the white lead, if present as the basic carbonate, should exceed the zinc oxide by at least 20 per cent. If the type of formulation employed does not permit of this excess of white lead, then all or the major portion of the white lead should be introduced as a basic lead sulphate in direct association with the zinc oxide, in the form of a high-leaded zinc.

If one were asked which of the white pigments had undergone the greatest improvement in the last fifteen years, the answer would probably be "lithopone." It is not generally realised, however, that there has been as great an improvement in some of the leaded zinc pigments. In this connection reference is made particularly to the leaded zinc of the 35/65 type—35 per cent. basic lead sulphate and 65 per cent. zinc oxide. The specific improvements were rather scattered at first, but in more recent years they have been rapid, and to-day there are reasons which appear sufficiently sound, leading to the conclusion that the high-leaded zincs will generally displace equivalent mechanical mixtures of white lead and zinc oxide in prepared paints where durability is the important consideration.

The most important function of white lead is its ability to form lead soaps—that is, lead linoleates—which bring about excellent retention or adhesion to the surface and prevent the film from becoming hydrophilic—that is, swelling in the presence of water, as does glue or gelatine. These lead linoleate soaps assist materially in maintaining a flexible film which adjusts itself to the stresses and strains resulting from progressive oxidation, and the alternate contraction and expansion of the surface over which applied. The next most important function of white lead is its relatively low oil-taking capacity, permitting the pigment particles to be very closely packed together, thus reducing materiallp the effect of the shrinkage stresses by diminishing the volume of dried oil or linoxyn between the particles. There is yet to be seen a good paint—dark colours excepted—which has stood the test of time under the varying climatic conditions throughout the United States which did not contain a substantial percentage of white lead, either the basic carbonate or basic sulphate.

A Definite Degree of Basicity

The introduction of a definite degree of basicity, that is, of combined lead oxide into the lead sulphate of a high leaded zinc, insures that it will form the normal amount of lead linoleate soap on the surface of the leaded zinc particles, which makes each particle an integral portion of the film, whereas a so-called inert pigment like barytes or the titanium pigments remain in the film by mechanical adhesion only. This association of the basic lead sulphate and zinc oxide, as shown by exposures represented both by test fence and house tests, greatly affects the behaviour of this pigment in the paint film. The tendency to produce a hard, brittle inelastic film—so characteristic of zinc oxide—is markedly reduced. There is more of a tendency to chalk than to crack and peel. The adhesion to the surface is improved. In certain especially high lead content pigments which we have produced experimentally, where the lead content is between 40 and 50 per cent., and the basicity that it, the ratio of lead oxide to lead sulphate, is high, we find the pigment taking on the essential characteristics in the film of a straight lead pigment—the zinc oxide characteristics have almost disappeared.

This becomes a little clearer if we recollect that we are dealing with pigment particles which are considerably less than a half micron in diameter. Then consider the tremendous surface area exposed to the action of the oil and its oxidation products. One cubic inch, actual volume, of a typical leaded zinc, zinc oxide or titanium oxide, represents a combined surface area in excess of 2,500 square feet. This gives us a better conception of the opportunities for the formation of a brittle zinc soaps with pure zinc oxide particles and the plasticising effect of the flexible lead linoleate soaps. It also presents one of the important reasons why a paint in which the zinc oxide is introduced by means of a high leaded zinc will outwear a similar composition in which the white lead and zinc oxide are introduced as separate pigments.

Retarding the Disintegration of the Film

The behaviour of water toward white lead and the other pigments is interesting. A paint film may be regarded as a semi-permeable membrane. White lead, either the basic carbonate or basic sulphite is extremely resistant to wetting with water—technically expressed, its angle of contact is high— and what is true of white lead is true of the lead linoleate soaps. The so-called inert pigments and also the titanium pigments have low angles of contact, that is, they are wet easily. Zinc oxide occupies an intermediate position. The high leaded zinc oxides also possess a high angle of contact and are hard to wet. The presence of substantial percentage of either of the white leads accompanied by lead linoleate soaps renders the surface of the film extremely difficult to wet. Also it is very difficult for the water to penetrate between the lead or leaded zinc particles because each particle has become a field of action in which the lead linoleate soaps formed at the interface have diffused outward from the particle into the surrounding film. Therefore, this swelling action is greatly retarded and minimised and the disintegration of the film is retarded.

Lithopone as an Exterior Pigment

Shortly after the close of the world war a tremendous improvement in lithopone took place, as is well known. The hiding power was stepped up, the non-livering qualities in acid varnishes improved, and more particularly the resistance to discolouration in sunlight was improved to the extent that enabled lithopone to enter permanently the field of pigments for exterior use. The demands made on lithopone as a pigment are much greater to-day than they were ten years ago, and it is not safe to generalise as to what will happen with a given vehicle until it has been tried out.

The suitability of the lithopone of to-day as an exterior pigment does not require extended discussion. Too many paint companies are using it successfully in exterior paints for us to longer hold to the viewpoint that it is suitable for interior usage only. To those who are not yet satisfied with lithopone as a component of exterior paints, Dr. Holley

therefore offers the following suggestions:— (1) The inclusion of about 5 per cent. of a heat processed linseed oil in the vehicle. This oil should have an acid value of about 9 or 10. (2) The use of a linoleate drier in which the manganese should not be in a greater proportion than 1 to 40. (3) A high pigment volume relationship to the non-volatile vehicle of not less than 30 per cent.—preferably 31 to 32 per cent. in the finishing coat. (4) The use of a high leaded zinc oxide of good basicity. The best results are secured with 50 per cent. of a 40/60 leaded zinc in which the basic lead sulphate has a ratio of lead oxide to lead sulphate of between 1 to 5 and 1 to 6. (5) This formulation contemplates the presence of not more than 35 per cent. lithopone and not to exceed 15 per cent. added inert pigment which can be the conventional combination of about half silica and magnesium silicate.

There are two choices of pigments for increasing opacity—the titanium pigments on the one hand and the commercially pure zinc sulphide pigments on the other. Most of us have had extended experience with the former. We know their good points—their high degree of opacity or hiding power, great retention of whiteness in the outside whites, accompanied by excellent dirt shedding qualities. Also their unfavourable characteristics—the tendency to chalk excessively unless the formulation is carefully controlled, the rapid fading of the light tints under relatively short exposure, and the retardation of drying, especially during cold weather.

Commercially pure zinc sulphide is the most recent white pigment of high hiding power. Those who have worked with this pigment find it extremely interesting in its properties. It has approximately twice the opacity of barium titanox, and 60 to 75 per cent that of pure titainum oxide. From a unit of hiding power standpoint it can become a vigorous competitor of the titanium pigments. Used in various pigment admixtures, its working qualities under the brush are distinctly superior to those of the titanium pigments. Several of the desirable features of pure zinc sulphide have been thoroughly demonstrated. It does not retard drying during cold weather as do the titanium paints. Therefore less manganese and cobalt driers are necessary. Light tints made with zinc sulphide retain their colour equally as well as those made with the best white lead and zinc oxide admixtures. This enables paint manfacturers to build up the hiding power of their light tints to any desired point, a feature which appeals, as most paint technologists have hesitated to use titanium pigments for this purpose.

Zinc sulphide possesses a good degree of whiteness, and chalks rather slowly. Like every other white pigment, however, it has characteristics not so desirable. Unless carefully processed, it is somewhat sensitive to sunlight in the presence of certain oils and driers. Alkali-refined oils and cobalt driers are perhaps the worst offenders. Some types of glyceryl-phthalate vehicles also promote discolouration. While it approaches white lead in resistance to wetting with water, it is relatively inert and requires the presence of a substantial percentage of lead pigment in the formulas in which it is used.

Present Economic Conditions in Sweden

Effect of the Kreuger and Toll Collapse

A REPORT on "Economic Conditions in Sweden" by Mr. W. J. Glenny, Commercial Counsellor to the British Legation at Stockholm, has been published for the Department of Overseas Trade by H.M. Stationery Office (2s. net). Mr. Glenny states in his report that it was not until the autumn of 1930 that the effects of the general economic depression were felt to any marked degree. This is explained by the fact that many of the staple industries habitually book orders a long time in advance of delivery, that "luxury goods" do not figure prominently amongst the exports and that the international fall of prices affected imports more than exports. During 1931, however, adverse conditions became intensified and the export industries were particularly affected. While early in 1931 purchasing power had seemed unaffected, unemployment was increasing and by the close of the year retail sales began to decline and business failures become more numerous. At the end of September, Sweden decided to abandon the gold standard and this brought a temporary improvement to certain export industries.

The country has at present several problems to face. Production costs in the export industries are high, particularly labour charges, the standard of living of the Swedish worker being high. The timber trade, one of the country's most important assets, has to face severe competition from Soviet Russia. The solution of these difficulties may well result in decreased consumption of imported goods. It is not, however, anticipated that the demand for high grade United Kingdom imports will shown a marked decrease, especially in view of the present currency conditions.

Sweden's financial position at the moment is dominated by the failure of Kreuger and Toll and the difficulties of the Match Company and the Skandinaviska Bank. Besides controlling the Swedish Match Co., which in its turn directly or indirectly controlled companies owning factories in various countries, Kreuger and Toll, in addition to their operations as international bankers and financiers making government loans, had such diverse interests as iron mines in Sweden and North Africa, gold mining in Sweden, house property in Sweden and Germany, telephone construction and operating in several countries, timber and wood-pulp mills in Sweden, etc. The Kreuger and Toll undertakings thus gave Sweden a prominent place in international finance, and their collapse must have a serious effect on the position of the country. Investigations are proceeding, and the company and certain allied concerns are still protected by a moratorium, so that it is impossible to measure the consequences, both domestic and foreign, of the crash. It has, however, been calculated that in April, 1932, the quotations of Kreuger and Toll and the Match Company's issues stood about £200 millions below their top values in 1928, and it is estimated that about 40 per cent. were held in Sweden.

The position of many Swedish companies, firms and individuals will be severely strained, and it is expected that taxation must be increased. Though it is not possible to forecast the severity and duration of the storm, there is no reason to fear that the country will not be able ultimately to weather it. The natural resources of Sweden, the industry and inventive faculties of the population and the soundness of its State finances all give it stability, in spite of the financial loss arising from the Kreuger crisis.

Claude Synthetic Ammonia Process

Means for Increased Efficiency

USING a single reaction tube and an initial pressure of 1,000 atmospheres for the gas mixture, the Claude process results in a 500 per cent. yield of ammonia. Four reaction tubes arranged in series are usually employed, thereby reducing the percentage of non-converted gases to a very low figure indeed. This small percentage nevertheless brings about a by no means insignificant wastage of energy since it issues from the final reaction tube at 850 atmospheres pressure, which must be reduced to 25 atmospheres before it can be returned to the fresh gas mixture.

According to R. W. Muller ("Chem. Fabrik," August 31, 1932, pp. 318-320), this energy loss has been overcome by a modification of the process whereby a fifth catalytic reaction tube is brought into action, in which the residual gases from each of the four standard tubes are converted to ammonia at a working pressure of 1,050 atmospheres, after having been brought to this pressure (from 850 atmospheres) by means of a specially designed super-pressure rotary pump. The latter has been designed by Gebr. Sulzer A. G., of Ludwigshafen, and closely resembles in many ways the well-known hyper-compressor of the same firm.

Progress in Building Research

Report of the Building Research Board for 1931

MANY important developments in connection with the progress of building research carried out under the Department of Scientific and Industrial Research are referred to in the Report of the Building Research Board for the year 1931 (H.M. Stationery Office, price 3s.).

Requests received by the Building Research Station for testing of materials are of two types. On the one hand, it may be a question of a whole series of tests selected with a view to enabling a report to be furnished on the general suitability of a material for building purposes; on the other hand, a single test result only may be wanted. The reports given by the Station in response to requests of the first type from various firms are proving of great value, and we consider that the furnishing of such reports is one of the most important functions of the Station. As regards requests of the second type, it has been the practice of the Station, wherever possible, to refer the applicant to independent consultants. But difficulty arises when the technique for the test is one which has been evolved by the Station and which is not altogether fully developed; or again, the applicant may desire to have the authoritative certification that is implied by a Government report.

Collaboration with Testing Laboratories

The purely logical solution of setting up a National Testing House has not been adopted on account of financial and other considerations. Instead a scheme has been worked out in collaboration with the various professional societies interested in the matter by which the assistance of commercial testing houses is being enlisted in a co-operative scheme. The essence of the proposed scheme is for the Station to refer individual tests to approved testing houses. The results of these tests will be incorporated in certificates issued by the Building Research Station, which will also utilise the services of such testing houses for routine tests which form part of a general investigation of a material on which a Government report is sought. In order to safeguard the position of the testing houses of the Department, a committee consisting of the presidents of the professional institutions consulted, and under the chairmanship of the chairman of the Building Research Board, has been appointed to decide upon applications from laboratories for inclusion in the scheme and to consider questions arising regarding the working of the arrangements.

In dealing with the work on cements the report states that the last few years has seen considerable advance in the rate of development of strength of cements. With the exception of permeability, this has not been accompanied by any corresponding improvement in other properties of cements which are of considerable importance. Thus, the volume changes occurring in set Portland cement concretes do not appear to have decreased, while the rate of evolution of heat on setting and hardening has increased. Although the latter may be advantageous in cold weather when dealing with thin sections of concrete, it leads in mass concrete to high internal temperatures and consequently to shrinkage movements on ultimate cooling. Other properties of cements are of importance from the aesthetic, if not from the engineering, standpoint. Among these are surface crazing and the production of staining and efflorescence on masonry and brickwork. The report suggests that the trend in recent years in cement manufacture seems to have been dominated too largely by one factor—that of the rate of development of strength, without sufficient consideration of other properties.

Waterproofing Agents for Walls

The efficiency and durability of treatment employed for the surface waterproofing brickwork and other building materials are being investigated both in the laboratory and upon an exposure wall to which a number of representative waterproofing agents have been applied. The test wall consists of seventeen brickwork panels of half-brick thickness separated from each other by impermeable partitions. Various bricks and mortars are used for the different panels and each panel is to be treated with waterproofing liquids. The faces of the various sections will be sprayed from a hose from time to time over a number of years. By noting the effect at the back of the panels during spraying information will be gained as to the performance of the treatments. Without any treatment it has been found that water passes through the wall rapidly under the spray and makes its first appearance at the back in times varying from 25 seconds to 3½ minutes on the different sections. It was noted that in every case the water passed through the mortar joints first and subsequently spread through the bricks. In nearly every case water penetrated the sections in Portland cement mortar slightly quicker than those in lime mortar.

The first six of the seventeen types of waterproofs selected are now being examined and on one of these most of the tests have already been completed. The liquid used consists of a solution of a vegetable oil in petroleum. It was applied in a single coat to porous red brick specimens by brushing. It was found to be easy to apply and produced practically no change in the appearance of the bricks. The tests showed that while the liquid, when applied to a fine-pored material such as brick, did not completely prevent the penetration of water under such conditions as would obtain during severe natural exposure, it so greatly diminished the rate of absorption that the treated surface could be regarded as waterproof. Its effectiveness would, however, necessarily be reduced in the case of materials of a coarser texture, or those which are liable to contains flaws or crevices, such as may occur in ordinary brickwork. It was found, for example, that the more pervious spots in a wall of normal construction were not rendered waterproof by the treatment.

Cosach Negotiations

Nitrate Shipments Cease

IT is understood that Mr. Whelpley, who recently went to Santiago in an attempt to secure the Chilean Government's support for the Guggenheim proposals for reorganising Cosach, has failed to persuade the Government to accept his ideas.

It will be recalled that the British Committee had refused to accept the Guggenheim solution of the Cosach tangle, maintaining that it was much too favourable to Guggenheims. Mr. Whelpley then attempted to force acceptance of his scheme by converting the Chilean Government to it. His failure therefore reduces the situation to a deadlock. Meanwhile, shipments of nitrate from Chile have virtually ceased since July 1 (the opening of the nitrate year), owing to the refusal of the banks to finance further additions to European stocks. Production is nominally being maintained at 56,000 tons a month, but this cannot be long continued.

A significant, if minor, move is the acquiescence of the Government in the operations of a small group of independent producers who refused to enter Cosach. These producers control stocks of some 50,000 tons, which, though not a large amount, is sufficient to weaken the price structure if forced on the market. There is evidence that the independents are offering nitrate abroad at prices well below the official price asked by Cosach.

Oil Imports Increasing at Montreal

PETROLEUM and gasoline are now included among the most important commodities handled through the Port of Montreal. Well over half-a-million tons of these commodities were handled in the first two and a half months since navigation on the St. Lawrence opened at the middle of April. To the end of June the amount of petroleum and gasoline landed totalled 559,368 tons, or 130,796 tons higher than in the corresponding period last year. Six companies are responsible for the oil imports into Montreal: the British American Oil Co.; Imperial Oil, Ltd.; McColl-Frontenac Oil Co., Ltd.; Shell Oil Co. of Canada, Ltd.; Sun Oil Co., Ltd., and Sunny Oil Co. of Detroit. The first four companies accounted for the bulk of the importations and of these the first three have large refining plants at Montreal East.

Automatic Water Distillation

A Choice of Apparatus

PURE distilled water at a cost of 1¼d. per gallon is possible by the use of the patent automatic gas heated stills supplied by Brown and Son (Alembic Works), Ltd., of London. These stills are built of hard rolled copper and coated with pure tin internally. They produce chemically pure water which passes the B.P. Specification test. The cost of production depends upon the method of heating, and is approximately 1.25d. per gallon for gas-heated stills; 0.33d. per gallon when steam-heated; 0.5d. per gallon when oil-heated; 0.75d. per gallon for stills heated by coal or coke; and 4.25d. per gallon for electrical heating, based upon the average charges for fuels throughout the country. By running off the distilled water at about 50° to 60° C. the distillate, if collected in air-tight receivers, will be ammonia-free. Receivers of pure tin-coated copper or leadless and saltless glazed fireclay only should be used, as the powerful solvent qualities of pure water will dissolve most metals and other materials.

Large consumers of distilled water such as mirror and reflector silverers, photographic film producers, etc., use crude oil for the oil-fired stills; these operate at about 0.22d. per gallon,

Patent Automatic Still for Producing Distilled Water, as supplied by Brown and Son (Alembic Works), Ltd.

but the higher installation costs are only justified with consumptions or from 500 to 1,000 gallons per day.

All these stills will also give a continuous supply of hot tap water and will displace a geyser; if a supply of hot water is of any value to the user, this value can therefore act as a set-off on cost of running. The capacity varies from 9 to 100 gallons per hour. Storage jars can be supplied in special leadless glazed fireclay of 5, 10, 15 or 20 gallons capacity; copper storage tanks, coated internally with pure tin, are made to order. In cases where a battery of stills is needed to meet requirements, they can be mounted on an independent iron table, alongside the storage tank. A motor-driven pump is then fitted beneath the table to distribute the water to various workrooms and laboratories in the building.

Fire-box stills have a water-lined fire-box of welded mild steel, entirely surrounded and covered by water; facilities are also provided for readily clearing away any lime or other solid deposits. In the steam-heated stills, the steam service is not used for condensation; it serves merely as a source of

The Davies Automatic Water Distilling Apparatus (A. Gallenkamp and Co., Ltd.)

heat. Such stills are suitable for working on steam pressures ranging from 10 to 100 lb. per sq. inch. For the electrically heated stills the approximate current consumption is 4,500 watts for stills of a capacity of one gallon per hour.

The Davies' automatic water still, which is shown in our second illustration, is supplied by A. Gallenkamp and Co., Ltd. This still is made entirely of copper, heavily tinned inside, and consisting of three parts boiler, water and air-cooled condenser, and cover which acts as an air condenser and is very convenient for drying dusters, etc., in the laboratory. The steam passes up the centre chamber and immediately comes into contact with the cover, and then passes down between the narrow walls of the water and air-cooled condenser.

Chlorination of Russian Coal

A New Source of Aluminium Chloride

FROM preliminary investigations on the chlorination of Russian coal, reported by Budnikoff and Nekritsch, "Chem-Zeit.," August 27, 1932 (p. 681), the possibility is envisaged of conducting the operation in rotary furnaces with utilisation of the heat of reaction. At a maximum temperature of 1,000° C., high-ash Russian coal or the ash itself has been found in the experimental scale to give a 90 per cent. yield of aluminium chloride, together with smaller amounts of ferric chloride and silicon tetrachloride. The coal from various Russian and Ukrainian sources possesses a 30 per cent. to 40 per cent. ash content which in turn contains aluminium oxide in an amount varying from 31 per cent. to 44 per cent. of the weight of ash. In addition to its widespread applications in such departments as electro-plating, textiles and pottery manufacture, aluminium chloride is a valuable auxiliary in the working up of raw petroleum. Large quantities are used up in the separation of sulphur from the crude fractions, the conversion of unsaturated into saturated hydrocarbons and the cracking processes for production of low molecular fractions.

British Overseas Chemical Trade in August

Notable Increase in Exports

Exports of chemicals, drugs, dyes, and colours during August amounted to a total of £1,433,328, being £316,203 higher than the figures for August, 1931. Imports totalling £824,779 were lower by £233,232, and re-exports totalling £34,029 were lower by £17,708, as compared with August, 1931.

	Quantities. Month ended August 31. 1931.	1932.	Value. Month ended August 31. 1931.	93161
			£	£
Imports.				
Acetic Anhydride .. cwt.	453	—	1,343	2
Acid, Acetic .. tons	760	505	26,426	16,846
Acid, Tartaric, including Tartrates .. cwt.	3,033	2,385	16,671	9,963
Bleaching Materials ,,	8,334	6,882	9,037	7,869
Borax .. .. ,,	28,956	8,741	17,294	4,806
Calcium Carbide .. ,,	89,536	55,034	54,802	34,341
Coal Tar Products, not elsewhere specified value	—	—	1,413	1,162
Glycerine, Crude .. cwt.	1,113	460	1,315	645
Glycerine, Distilled ,,	1,641	1,025	3,302	1,949
Red Lead and Orange Lead cwt.	3,824	1,658	4,759	1,767
Nickel Oxide .. ,,	85	—	365	—
Potassium Nitrate (Saltpetre) .. .. cwt.	6,866	3,316	5,648	3,041
Other Potassium Compounds .. .. cwt.	447,730	487,697	179,019	210,885
Sodium Nitrate .. ,,	51,760	10,085	22,190	4,550
Other Sodium Compounds cwt.	36,039	18,646	21,403	14,861
Tartar, Cream of .. ,,	1,421	670	5,679	2,363
Zinc Oxide .. tons	583	36	13,168	697
Other Chemical Manufactures .. .. value	—	—	247,452	191,043
Quinine and Quinine Salts oz.	37,267	85,100	3,296	8,200
Bark Cinchona (Bark Peruvian, etc.) .. cwt.	416	1,092	1,915	6,610
Other Drugs .. value	—	—	104,625	62,924
Intermediate Coal Tar Products .. cwt.	71	67	863	265
Alizarine and Alizarine Red .. .. cwt.	—	—	—	—
Indigo, Synthetic .. ,,	—	—	—	—
Other Dyestuffs .. ,,	3,641	3,305	88,634	86,472
Cutch .. .. ,,	2,461	1,044	4,097	1,222
Other Extracts for Dyeing cwt.	1,009	1,299	3,482	3,643
Indigo, Natural .. ,,	—	—	—	3
Extracts for Tanning ,,	86,052	44,489	71,071	32,641
Barytes, Ground .. ,,	37,865	14,133	7,018	2,563
White Lead (Dry) ,,	16,655	4,417	22,299	5,609
Other painters' colours and materials .. cwt.	94,397	87,977	119,425	107,237
TOTAL .. value	—	—	1,058,011	824,779
Exports.				
Acid, Sulphuric .. cwt.	3,275	2,044	2,312	1,696
Acid, Tartaric, including Tartrates .. cwt.	628	781	3,061	3,524
Ammonium Chloride (Muriate) .. tons	206	283	3,177	4,664
Ammonium Sulphate ,,	20,359	52,382	132,216	234,228
Bleaching Powder (Chloride of Lime) .. cwt.	44,186	60,447	12,188	18,788
COAL TAR PRODUCTS—				
Anthracene .. cwt.	—	—	—	—
Benzol and Toluol gal.	1,861	197,728	189	18,300
Carbolic Acid (crude)	11,488 gal.	21,111 gal.	814	2,019
Carbolic Acid (crystals) cwt.	2,067	1,043	4,804	3,329
Cresylic Acid .. gal.	56,787	57,671	6,245	5,878
Naphtha .. ,,	6,265	3,533	626	171
Naphthalene (excluding Naphthalene Oil) cwt.	8,299	9,513	2,014	1,861
Tar Oil, Creosote Oil, etc. .. .. gal.	406,597	1,880,844	8,230	34,065
Other Sorts .. cwt.	4,907	12,373	5,556	4,458
COAL TAR PRODUCTS—	—	—	28,478	70,081
Copper, Sulphate of tons	611	3,585	10,913	56,063
Disinfectants, Insecticides, etc. .. .. cwt.	26,598	27,265	60,903	62,188
Glycerine, Crude .. cwt.	2,291	728	2,115	715
Glycerine, Distilled ,,	7,986	4,665	19,096	16,689
Potassium Chromate and Bichromate .. cwt.	2,154	686	4,339	1,807
Potassium Nitrate (Saltpetre) .. .. cwt.	1,132	2,181	1,940	3,754
Other Potassium Compounds .. .. cwt.	2,519	1,756	7,615	8,621
Sodium Carbonate, including Crystals, Ash and Bicarbonate .. cwt.	202,088	228,220	56,223	63,420
Caustic Soda .. ,,	65,297	167,011	49,329	100,907
Sodium Chromate and Bichromate .. cwt.	2,591	1,369	4,337	2,537
Sodium Sulphate, including Salt Cake .. cwt.	79,748	77,976	8,452	8,447
Other Sodium Compounds cwt.	44,959	50,757	51,733	59,079
Zinc Oxide .. tons	303	708	7,209	13,303
Other Chemical Manufactures .. .. value	—	—	193,737	243,591
Quinine and Quinine Salts oz.	262,542	137,515	23,074	17,501
Other Drugs .. value	—	—	186,813	197,351
Dyes and Dye-stuffs (Coal Tar) .. .. cwt.	10,132	7,276	80,400	65,341
Other Dyestuffs .. ,,	5,310	12,333	4,931	9,794
Barytes, Ground .. ,,	1,476	8,127	681	1,563
White Lead (dry) ,,	1,376	1,738	2,193	2,861
Paints and Colours in paste form .. .. cwt.	16,802	15,137	28,033	26,467
Paints and Enamels prepared .. .. cwt.	26,955	25,049	77,895	74,374
Other painters' colours and materials .. cwt.	31,048	38,554	53,732	63,974
TOTAL .. value	—	—	1,117,125	1,433,328
Re-Exports.				
Acid, Tartaric, including Tartrates .. cwt.	63	26	349	169
Borax .. .. ,,	13	—	7	—
Coal Tar Products, not elsewhere specified value	—	—	6,618	17
Potassium Nitrate (Saltpetre) .. .. cwt.	60	72	88	109
Sodium Nitrate .. ,,	502	6,400	256	3,200
Tartar, Cream of .. ,,	439	128	1,693	549
Other Chemical Manufactures .. .. value	—	—	12,717	9,814
Quinine and Quinine Salts .. .. oz.	5,402	6,224	488	840
Bark Cinchona (Bark Peruvian, etc.) .. cwt.	527	63	3,087	173
Other Drugs .. value	—	—	21,600	15,234
Cutch .. .. cwt.	355	152	565	247
Other Extracts for Dyeing cwt.	73	171	299	827
Indigo, Natural .. ,,	—	17	—	490
Extracts for Tanning ,,	2,181	1,164	2,147	938
Painters' colours and materials .. .. cwt.	594	308	1,696	731
TOTAL .. value	—	—	51,737	34,029

Egyptian Phosphate Shipments to Europe

THE first shipment of phosphates from Kosseir, Red Sea (on the African side of Egypt) to pass through the Suez Canal was made in 1917. Phosphate shipments have since continued to increase and during 1930 reached the maximum total of 144,000 tons. During 1931, there was a decline of approximately 63,000 tons, due to world depression. Shipments through Suez during the first quarter of 1932 totalled 27,000 tons.

Works Equipment News

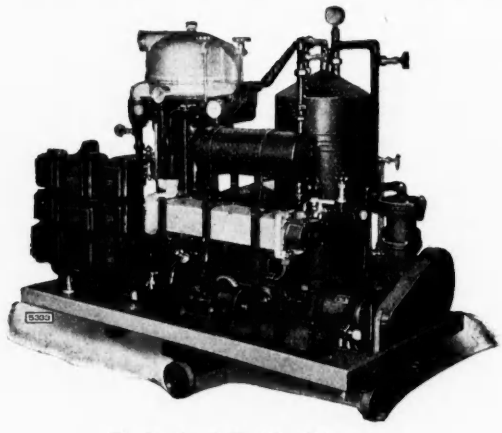
Modern Aids for the Chemical and Allied Trades

WALKER, CROSWELLER and Co., Ltd., have followed up their "Arkon" liquid density recorder (illustration in THE CHEMICAL AGE, August 20, 1932), with a new instrument of the same kind for gases. To secure uniformity and a lower price, the outside castings of all the instruments comprising this Arkon range are identical. The new gas instrument works on the simple principle of the direct relation between the density of the gas and the draught created by the gas rising up a vertical pipe and burning at the top. This is by no means an innovation. Its merit lies more in its constructional application. By means of a special hinged float a large and certain pen movement is ensured. The records of the gas density are made over a chart width of 100 mm., while the accuracy of the records is guaranteed to ±2 per cent. With the door open all parts are at once accessible and being standard can be easily renewed. Daily attendance is not required, as the ink reservoir is large, a 7-8 day clock is employed and the unwinding chart rolls last for 1½ months.

Centrifugal Separators

The use of centrifugal separators for the clarification and separation of industrial liquids has not in the past been as extensively used in the chemical industries as some other industries. This is primarily due to the fact that the standard materials of construction which are found suitable for dairy work, varnish, lubricating oils, etc., are not usually sufficiently resistant to the industrial liquids to be handled in chemical work. This has naturally retarded the use of the centrifugal separator and has prevented the chemical industry reaping the benefits which other industries have been able to obtain by the replacement of older methods, such as filter presses and settling tanks, by more efficient and cheaper centrifugal methods.

In recent years, however, much attention has been given by centrifuge makers to supplying machines which will meet



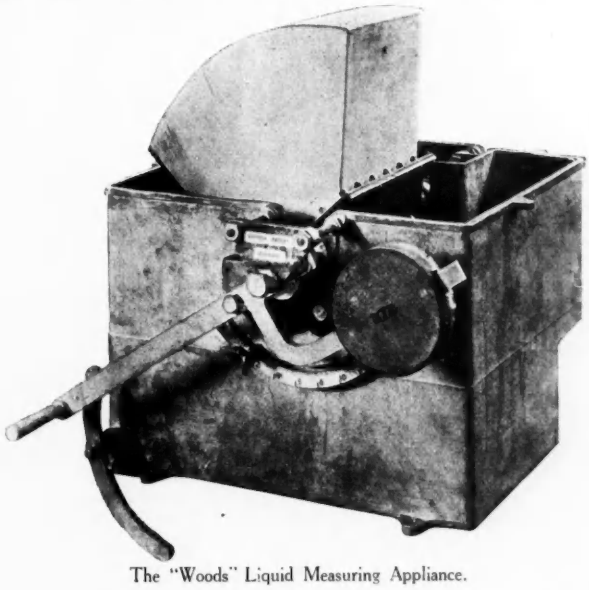
The De Laval Centrifugal Separator.

the requirements of the chemical industry and many De Laval centrifugal separators of stainless steel construction have been supplied by the Alfa-Laval Co., Ltd., of London. These machines are not only used where the liquid contains acids or salts which would cause corrosion, but are also finding a large field in those cases where due to the special requirements of the product, it is absolutely necessary to prevent any metallic contamination of the material being treated. This occurs in the manufacture of many foodstuffs, pharmaceutical products, etc. A special type of De Laval separator in which the solid matter is continuously discharged instead of being retained in the bowl is also finding increasing application in the chemical and allied industries. These machines, like standard De Laval industrial separators, can now be supplied so that all parts with which the liquid comes into contact are made of stainless steel. Machines can also be supplied for use at very high temperatures and in certain cases for use under high pressures. For other purposes, machines have been furnished to run under 90 per cent. vacuum, the frame of the separator and all couplings being absolutely tight against the inlet of air. With these machines, the liquid is centrifuged in a vacuum which results in other changes being produced than those which can be produced by centrifugal force alone.

The field of application of centrifugal separators is an ever widening one and each year seems to bring forth new and improved designs which render the use of these machines possible for industrial problems for which centrifugal methods were previously considered impossible.

Liquid Measurement in Process Work

AN appliance which functions by operating a handle to start the flow, and which stops automatically when a predetermined quantity has run out, has been invented by Mr. Francis T. Woods for use in cases where process work requires the addition of a specified quantity of liquid. In most branches of the chemical industry the importance of exact measurement is recognised, but there are other branches in certain sections of the food industry, for example, where a recognition of its importance would lead to considerable economies. The apparatus designed by Mr. Woods



The "Woods" Liquid Measuring Appliance.

is claimed to be an advance upon methods of measured delivery involving the use of graduated tanks and similar appliances. The Woods apparatus consists of a measuring vessel having on its lower face a non-return valve opening inwards, thus permitting the entry of liquid when the bottom of the vessel is depressed below a bulk surface, and ensuring the retention of the contents when the vessel is withdrawn from bulk. The depth of immersion is limited by a stop secured to a scale graduated in units of capacity, and the measured volume can be adjusted over a range of 6:1 or more. The bulk supply is contained in the outer tank shown in the illustration, and its level is maintained within close limits by a float-operated valve of special design. The measuring vessel is carried by trunnions, and on being released by operating the latch shown in the bottom left-hand corner, rotates contra-clockwise by its own weight and sinks into the liquid until the hand lever engages a stop secured in a pre-determined position on the scale. The liquid rises through the non-return valve into the vessel to the level

of the bulk supply, the air escaping through a vent. The hand lever is then rotated clockwise until the latch secures it in the discharge position shown. The rotation of the vessel closes the non-return valve, and a rapid discharge is made through the rear trunnion. The volumetric error is negligible, the working parts are easily accessible and the construction lends itself to the use of a wide range of special materials without alteration of design. The appliance can be supplied mounted on a wheeled truck to form a portable unit fed by a hose, and where used for drum filling can be fitted with an outlet valve operated by the hand lever to close before removing a filled drum. The appliance is made in a range of three capacities, namely 2 to 12 quarts, 1 to 6 gallons and 1½ to 12 gallons. The device, which is now in use in several works, is protected by British Patent No. 328,687.

Improvements in Handling Carboys and Drums

Two new appliances of interest to the chemical industry have been introduced by Harry Heymann, Ltd. One is the "Monopol" cask conveyor and tippler, which considerably facilitates the transport and emptying of casks and drums.

The "O.P." Air Valve in Operation.

A container weighing half a ton or even more can be lifted with one hand with the apparatus, and the widest of vessels to be filled can be placed under the drum when it is suspended. The appliance can be wheeled about as easily as an ordinary sack truck, and the drum is merely rolled forward on to the conveyor. It is immaterial whether the drum is large or small, heavy or light, or of wood or iron. The drum rests

The "Monopol" Conveyor and Tipler.

on the carrier and is wound up into position, the roll spindle being capable of being turned with one hand. When at the top the drum is held firmly in position by means of two protections, and it can then be turned for the liquid to flow out. The appliance is made in three sizes, to take drums up to 5½ cwt., up to 12 cwt. and up to one ton respectively.

The other new appliance is the "O.P." air valve for carboy tipplers. The valve can be attached to any carboy tippler with a tipping rod and it is inserted in one movement, irrespective of the size and width of the carboy. The valve contains no rubber parts and is therefore not restricted in its application to particular liquids. It has an interchangeable air tube, made of vulcanite and lead, and it ensures an unlimited and steady flow, with no splashing or loss of liquid.

A Choice of Electrical Resistance Materials

A NEW catalogue has just been issued giving technical data relating to the electrical resistance alloys manufactured by the Telegraph Construction and Maintenance Co., Ltd., and marketed throughout the world by Wild-Barfield Electric Furnaces, Ltd. The latter company, incorporated in 1917, was the first British company to specialise in the manufacture of electric resistance furnaces and heating elements. Success in this field is largely dependent upon the ability to obtain nickel chromium resistance alloys of proved and consistently high quality, and since they commenced manufacture until the present day Wild-Barfield have had under examination and test practically every resistance alloy marketed anywhere in the world. Pyromic rods and wires were brought to their notice some years ago and as it was found, after exhaustive comparative tests, that Pyromic nickel-chromium resistance elements offered advantages and possessed to a marked degree properties which made them undoubtedly superior to other nickel-chromium alloys on the market, an arrangement was made under which Pyromic resistance elements are used exclusively in Wild-Barfield furnaces, and Wild-Barfield Electric Furnaces, Ltd. have the sole world distributing rights (excluding Canada) for the electrical resistance alloys manufactured by the Telegraph Construction and Maintenance Co., Ltd., whose electrical resistance alloys are melted in high frequency induction furnaces under metallurgical control. This method of melting obviates contamination of the alloys from fuels (as in gas, oil or solid fuel furnaces) or electrodes (as in arc furnaces). The molten metal is contained in a clean refractory bath and is exposed to no external contact other than with air. Every melt is thus produced entirely free from those deleterious impurities inevitably associated with the older methods of melting, such as sulphur, carbon and oxygen. In all processes other than induction melting a definite addition of manganese is made to the melt in order to overcome the effect of the sulphur present. The addition of manganese to the binary solution of nickel and chromium has the inevitable effect of lowering the melting point of the alloy 15° to 20° C. Carbon is a fruitful source of cracking and hot spots. If present during melting it is dissolved and then precipitated into irregularly spaced masses which result in the formation of areas or higher electrical resistivity and, in certain cases, the superficial disintegration or cracking of the element. Both these defects seriously reduce the working life of the

element and are the cause of many premature failures and burn outs. The precipitation of carbon also results in an increase of "creep" or permanent growth after continued running at high temperature. Oxygen is usually present as chrome oxide or associated with silicates. The high frequency induction furnace automatically expels these undesirable impurities from the body of the melt, leaving a perfectly clean metal.

Pyromic is a binary alloy of 80 per cent. nickel and 20 per cent. chromium, commercially free from carbon, iron, manganese and silicon. It is melted in high frequency induction furnaces from the purest raw materials obtainable and owing to its freedom from contamination it has (a) a higher melting point (1,390° C.), and (b) a longer working life than any other similar alloy at present obtainable. It is specially designed for high temperature heavy duty service, in particular for the temperature range 850°-1,150° C. in electric furnaces, high temperature heating elements and the like. Mechanically, in the annealed condition, it is soft and ductile. easily formed into coils, hairpins, etc., but it is free from any tendency to radial cracking, superficial disintegration or hot spots. The specific resistance is 102 microhms per cubic cm.

Calomic is a ternary alloy containing nickel, iron and chromium in the proportion of 65 : 20 : 15. Like Pyromic, it is commercially free from other impurities. It will not withstand such high temperatures as Pyromic but it can be safely used up to temperatures of 1,000° C. and its strength at this temperature is actually rather greater than that of Pyromic. Its working qualities, however, are similar to those of Pyromic, the specific resistance being 104 microhms per cubic cm.

Telconstan is a copper nickel alloy in which the proportions of copper and nickel are chosen to give a negligible temperature coefficient of resistance. This type of material is very much used for electrical resistances and in motor starters, shunts, etc. It is very soft and ductile, and has a specific resistance of 49 microhms per cubic cm.

Ultra-Violet Rays from Daylight

APPRECIATION of the value of ultra-violet radiation as an aid in the performance of many analytical operations has been making rapid headway of recent years, and there can be

few large research or industrial laboratories which do not make frequent use of this new aid in the examination and quality-control of raw materials and manufactured products. New applications of ultra-violet radiation analysis are constantly being found, and among the materials already found to lend themselves to examination by this means are butter, cheese, cod-liver oil, cotton, flour, gelatine, glass, ivory, mica, molasses, oils, paints, paper, silk, sugar, tannins and varnishes. Until recently, however, such examinations required a costly and complicated equipment with an artificial source of light, such as a quartz lamp or arc-light, but there is now available a handy and inexpensive apparatus, known as the "Callophane." This apparatus is simply a folding box for research by means of ultra-violet rays from daylight. Its effect depends upon the presence of a glass plate, specially devised to filter from daylight the ultra-violet rays and to absorb the unwanted rays. It is obtainable from Griffin and Tatlock, Ltd., of London.

Pumps of Acid Resisting Iron

The design of the centrifugal pumps supplied by the Lennox Foundry Co., Ltd., has been evolved with the object of making possible the construction of a pump in the highest quality corrosion resisting metal combined with high efficiency in continuous service. Difficulties in the machining, drilling, tapping, etc., of high silicon irons generally lead to some compromise being made involving the sacrifice of corrosion resisting properties in favour of greater machinability and strength. In designing these pumps, however, the object has been to obtain the greatest possible simplicity, a minimum number of wearing parts, the elimination of all bolt-holes, studs, flanges, etc., thus permitting the use of only the highest quality metal throughout. The pumps can be made in various metals such as Tantiron, Tantcopper, regulus metal, etc., the only parts made in the special metal being the pump casting, cover and gland, the impeller and the impeller shaft. The pump casing is of volute form, and provided with end suction cover. The volute being proportioned to transfer the velocity energy imparted by the impeller into pressure head with minimum loss and having tangential discharge branch, the suction cover being provided with axial suction branch. Both pump casing and suction cover being made in the specified metal. The suction and discharge branches being provided with cast iron clips for connecting to suction and discharge pipes. The stuffing box is formed in the driving side of the pump casing and is of ample depth to prevent undue leakage and provided with a gland of the specified metal adjusted by means of studs carried by a split collar clamped and registered round the outside of the stuffing box. The impeller is of the single inlet type, cast in the specified metal and statically balanced on its shaft, the angles of the vanes at inlet being designed to impart velocity to the liquid with the minimum of loss. The pump shaft is of ample diameter for the power transmitted and is made from high nickel-chromium acid resisting steel. The pump frame and bearing housing are in one piece and made of close grained cast iron, the pump end being of heavy flange section and recessed to register the spigot on the pump casing, whilst the pump casing and suction cover are held firmly in position and perfect alignment by means of a clamping ring registered on outer diameter of suction cover and secured by steel bolts.

Standard basins, vessels, pans and pipes are also supplied in tantiron. The use of the cascade system in the process of concentration of sulphuric acid, for instance, is widely known and Tantiron basins are generally recognised as the best for this purpose. For resistance to corrosion and breaking under severe working conditions they are unrivalled. Large numbers of these have also been supplied for the concentration of lead nitrate liquors, zinc chloride and muriate of ammonia. The need of a strong, hard, acid resisting cock has also been supplied by Tantiron and Tantcopper. Cocks made in stone and earthenware are fragile and very sensitive to extreme variation of temperature, while the lead cock is soon rendered defective if used on gritty liquids. Tantiron cocks are free from these disadvantages and are in all respects the most efficient where acids and corrosive fluids are handled.

Nickel-Chromium Steel Furnace Parts

IN a new smelter erected at Rönnskar, for the treatment of the auriferous copper ores of the Boliden mines, the very high arsenic content of the ores caused rapid deterioration of the cast iron rabbles, in the roasting furnace; the substitution of special nickel-chromium steel for the rabbles has proved to be a satisfactory solution.

Chemical Industry Lawn Tennis Tournament

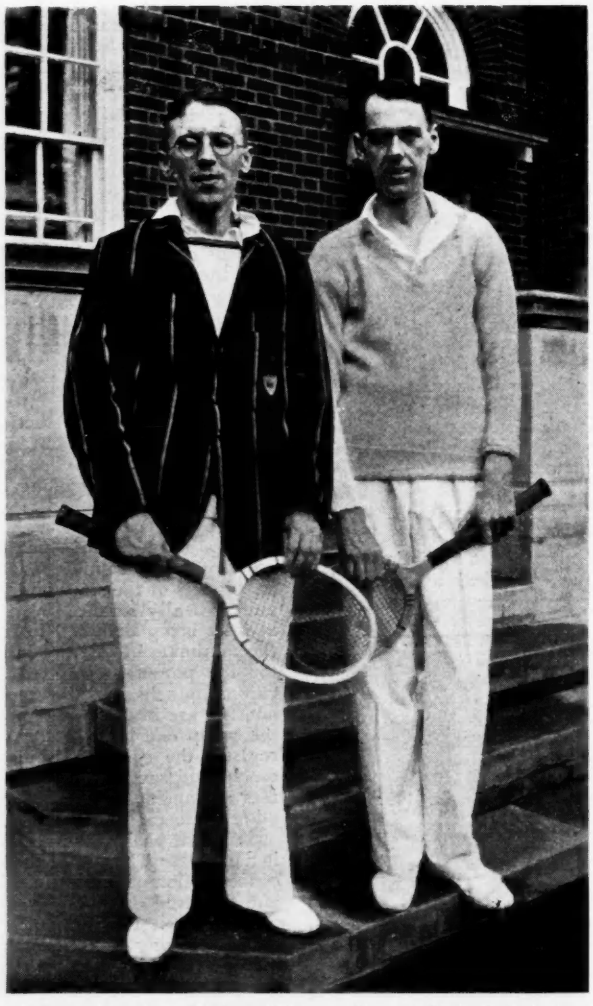
The Silver Cup goes to North Wales

THE second annual Chemical Industry Lawn Tennis Tournament was completed on September 10, when the final match for THE CHEMICAL AGE Silver Challenge Cup was played at Blunt House, Oxted, by kind invitation of Sir Ernest and Lady Benn. The cup was won by S. E. Chaloner and W. Speakman (Monsanto Chemical Works, Ltd., Ruabon, North Wales), who defeated G. F. Hammond and L. Giltrow (Williams, Hounslow, Ltd.) by 6-2, 6-3. The match was played under a dull leaden veil of threatening clouds, and there was a slight shower during the second set, but it was not sufficient to cause any suspension of play, and a very enjoyable afternoon was spent.

Nearly one hundred guests, representing firms with which the finalists and many of the earlier competitors in the tournament were associated, were entertained by Sir Ernest and Lady Benn, and the match was watched with eager interest. The first set opened with one game in favour of the Hounslow pair, but Chaloner and Speakman quickly went ahead to lead 3-1. The score steadily proceeded to 3-2 and then to 4-2, and in the seventh game Hammond and Giltrow forced the play to 14 points before losing an advantage game. In the last game of the set they secured only a single point.

In the second set, the progress in games was 1-0, 1-1, 2-1, 3-1, 4-1, 4-2, 5-2, 5-3, 6-3. In the second game the Hounslow pair took the score to 12 points and in the sixth game they only conceded the cup winners one point. On the other hand the winners gained five of their six games at the expense of a single point in each game.

Mr. A. G. R. Clarke (G. A. Harvey and Co., Ltd.) acted as umpire. Mr. Clarke, with his partner, F. E. Peake, was a competitor in the early stages and got through the first three rounds successfully. Then his partner was removed to the north of England and the pair had to withdraw from the tournament.



W. Speakman and S. E. Chaloner (Monsanto Chemical Works, Ltd., Ruabon), Winners of "The Chemical Age" Silver Challenge Cup.

In addition to THE CHEMICAL AGE Silver Challenge Cup, which is held by the winners for twelve months, four miniature cups were awarded outright, one each for the winners and one each for the runners-up. The miniature cups for the winners were presented by Johnson Matthey and Co., Ltd., of 73/82 Hatton Garden, London. These cups were of silver, platinum plated by a new process which renders them untarnishable and stainless. The cups for the runners-up were of silver and were presented by Thomas Duxbury and Co., London.

Sir Ernest Benn, in calling upon Lady Benn to present the trophies, extended a cordial welcome to the visitors and congratulated the winners upon their fine achievement in winning the tournament in competition with representatives of the chemical industry from all parts of the country. He acknowledged the generosity of Johnson Matthey and Co., Ltd., in presenting for the winners the miniature cups produced by their latest process, and of Thomas Duxbury and Co., in presenting their equally acceptable silver cups for the runners-up. He announced with pleasure that Mr. Lloyd Willey, of Thomas Hill-Jones, Ltd., who was present to witness the match, had already offered cups for next year's tournament.

Lady BENN then presented the cups, amidst applause.

Mr. A. D. DAYSH, of the Monsanto Chemical Works, Ltd., proposed a hearty vote of thanks to Sir Ernest and Lady Benn for giving the visitors so happy an opportunity of visiting Blunt House and for their genial hospitality, to which Sir Ernest briefly responded, after rousing cheers had been given.

Mr. S. E. CHALONER, one of the winners, briefly thanked Mr. A. C. CROSS, Editor of THE CHEMICAL AGE, and his staff for the pleasure they had afforded to the tennis players in the chemical industry by organising the tournament, and Mr. CROSS responded.

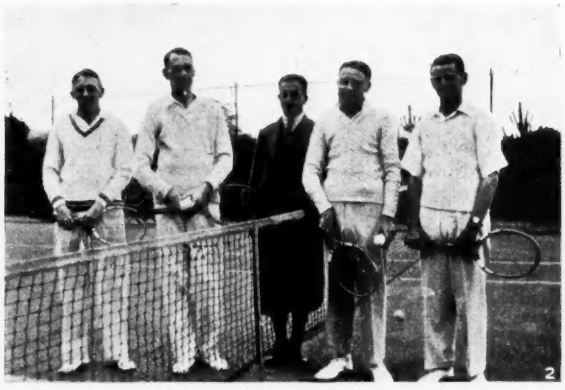
Following the final match, there was an interesting match between the defeated semi-finalists, in which J. W. Urban and F. S. Mortimer (Monsanto Chemical Works, Ltd., London) defeated C. G. Copp and A. Partner (Doulton and Co., Ltd. London) by 6-0, 6-1. Some of the best play of the afternoon was witnessed when S. E. Chaloner and W. Speakman (winners) played a friendly set with J. W. Urban and F. S. Mortimer (whom they defeated in the semi-final a month earlier), and the score on this occasion being 11-9 in favour of the cup winners.

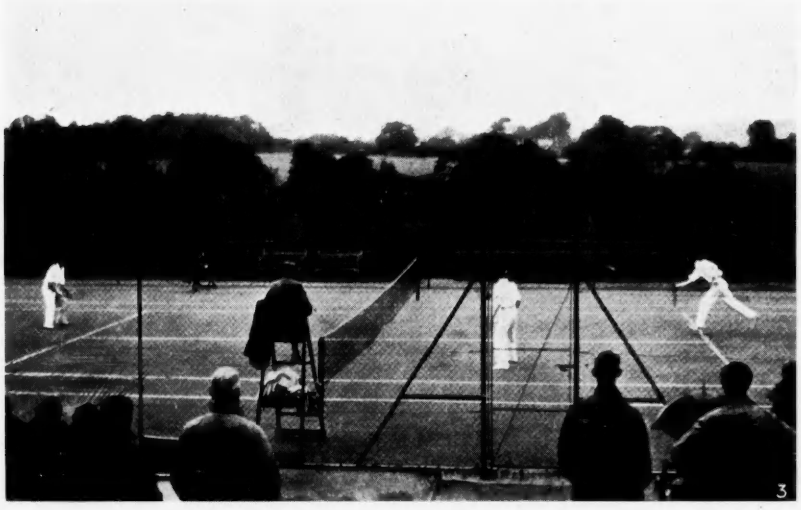
When the Chemical Industry Lawn Tennis Tournament was inaugurated last year there were 26 entries (representing 13 firms) comprising 19 from London, three from Birmingham, three from Nottingham and one from North Wales. This year there were 46 entries (representing 25 firms), comprising 33 from London, three from Birmingham, two from Ruabon, two from Grangemouth, and one each from Derby, Widnes and Liverpool.

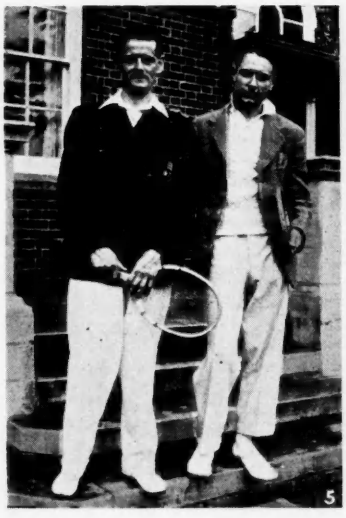
We gave last week the respective records of the finalists through the preceding five rounds of the tournament. A final analysis of ther play gives the following figures:—

	Chaloner & Speakman			Hammond & Giltrow		
	Played	Won	Lost	Played	Won	Lost
Matches	6	6	0	6	5	1
Sets	13	12	1	12	10	2
Games	116	78	38	98	66	32

Some Snapshots at Oxted







THE FINAL OF THE CHEMICAL INDUSTRY LAWN TENNIS TOURNAMENT AT BLUNT HOUSE, OXTED, ON SEPTEMBER 10.

1. Sir Ernest and Lady Benn receiving the Guests. 2. The Finalists with the Umpire prior to the Match. 3. The Tennis Final in progress.
4. Lady Benn and the Finalists. 5. G. F. Hammond and L. Giltrow (Williams, Hounslow, Ltd.), the Runners-up.
6. Cutting the "Tennis Cake" after the Match.

New Technical Books

INDUSTRIAL CHEMICAL CALCULATIONS; THE APPLICATION OF PHYSICO-CHEMICAL PRINCIPLES AND DATA TO PROBLEMS OF INDUSTRY. By O. A. Hougen and K. M. Watson. Pp. 502. Chapman and Hull, Ltd. 28s. net.

IN this book certain industrially important principles of chemistry and physics have been selected for detailed study. The significance of each principle is exhaustively developed and its applicability and limitations are scrutinised, but no attempt has been made to discuss the unit operation of chemical engineering or the more specialised and advanced studies of chemical engineering operation and design. The text has been written primarily to fill a definite need which exists in the training of chemical and metallurgical engineers. General courses in physics and physical chemistry, it is pointed out, cannot give the average student the thorough familiarity with the practical applicaions of fundamental principles which is so necessary in dealing with complicated industrial problems. The material presented should prove valuable to the industrial chemist and also to industrial engineers who are not trained primarily in the chemical field, for it offers good training in quantitative reasoning and in methods of calculation, and also leads to a familiarity with the technical terms and units involved.

In the calculations which are presented, care has been taken to see that the reasoning is logical and apparent. Each individual step is indicated, and arithmetical short-cuts and condensed forms of calculations are avoided in order to clarify the reasoning. Many condensed tables and charts are, however, incorporated to supply data for the problems and illustrations and to serve for convenient reference. The various chapters cover weights and compositions; stoichiometry; compressibility of pure gases; calculations involving gaseous mixtures; vaporisation and condensation; calculations on crystallisation, adsorption and distribution; thermophysics; thermochemistry at standard conditions; thermochemistry of industrial reactions and fuels; weight and heat balances, in combstion processes and in chemical and metallurgical processes; distillation equilibria, and calculations involving chemical equilibria. The object of this last chapter is to develop and present methods for the useful application of the specific data which are available regarding the equilibrium conditions of chemical reactions. The kinetic theory of the mechanism of chemical reactions is discussed and the significance of the equilibrium constant is developed from this viewpoint, but the major portion of the chapter is devoted to the effective utilisation of empirical data in the calculation of equilibrium compositions of industrial systems. In chapter XI there is presented the weight and heat balances of a chamber sulphuric acid plant (which extends to 22 pages), and a similar set of calculations for a blast furnace (extending to 12 pages).

* * *

PHANTASTICA: NARCOTIC AND STIMULATING DRUGS. By Louis Lewin. Translated from the second German edition by P. H. A. Wirth. Pp. 335. Kegan Paul, Trench Trübner and Co. 15s. net.

This is a comprehensive book, which appeals both to the general reader and to the doctor, chemist and psychologist. To understand drugs and to see them in their true light, we must know a good deal of their history, which forms an essential part of medical evolution. The author of this book has succeeded in giving us not only a fascinating description of the nature of stimulating and narcotic drugs, and their use or abuse over the whole world, but a lucid study of the problem of narcomania in civilised countries from a modern post war viewpoint. After a general introduction, the subject is divided into four parts. The first deals with Euphorica, or mental sedatives, of which the best known are opium, morphia, codeine and cocaine. The second deals with Phantastica, or hallucinating substances, such as Indian hemp, alcohol, chloroform, ether and nitrous oxide. Much interesting information on temperance and abstinence is contained in this section. The third part deals with Hypnotica, or soporifics, of which chloral, veronal, potassium bromide and kava-kava are prominent examples. The final part is devoted to Excitantia, and here a full examination is made of the use and properties of camphor, betel, coffee, tea, the kola nut, maté, cocoa and tobacco.

Key Industry Duties

THE question of the renewal of the Safeguarding of Industries (Exemption) No. 5 Order, 1931, and No. 6 Order, 1931, made under Section 10 (5) of the Finance Act, 1926, is now under consideration by the Board of Trade. The articles covered by these Orders which exempt them from duty until December 31, 1932, are:—

Acid adipinic; acid isobutyl allyl barbituric; acid oxalic; acid propionic; amidopyrin (pyramidon; dimethylamidoantipyrine); ammonium perchlorate; barbitone (veronal; malonal; malourea; acid diethyl barbituric; diethylmalonylurea; hypnogen; deba); bromural (dormigene); butyl methyl andipate; calcium gluconate (calcium glyconate); celtium oxide; chinoline (quinoline); chinosol; cocaine, crude; dial (acid diallyl barbituric); dicyandiamide; didial (ethyl morphine diallyl barbiturate); dimethyl sulphate; diphenyl; dyphenyl oxide; dysprosium oxide; elbon (cinnamoyl para oxyphenyl urea); erbium oxide; ethyl abietate; ethylene bromide; eukodal; europium oxide; furfurol; gadolinium oxide; geranium oxide; glycol ethers; guaiacol carbonate (duotal); holmium oxide; hydroquinone; integrators (planimeter type); R. Lead acetate; lead tetraethyl; lipoiodin; lutecium oxide; mercury vapour rectifiers, having mercury cathodes; metaldehyde; methyl cyclohexanol methyl adipate; methyl sulphonal (diethylsulphonemethylmethane; trional); methylene chloride; neodymium oxide; nickel hydroxide; oxymethyl paraoxyphenyl benzylamine methyl sulphate; papaverine; phenacetin (acetparaphenetidine); phenazone (antipyrine; phenyl dimethylpyrazolone; analgesin; anodynine; dimethyl oxychinizin); phenetidine, para-; phloroglucine; photogravure screens (both rulings on one plate exceeding 40 inches in length; phytin; piperazine (diethylene-diamine; dispermin); planimeters; R. potassium chlorate; potassium ethylxanthogenate (potassium xanthogenate); patassiumguaiacol sulphonate (thiocol); R. Potassium hydroxide (R. Potassium caustic; R. potassium hydrate); R. potassium permanganate; praseodymium oxide; pyramidon-veronal; quinine ethyl-carbonate; radium compounds; resorcine (resorcinol); salol (phenyl salicylate); samarium oxide; scandium compounds; sodium ethyl methyl butyl barbiturate; strontium carbonate; strontium nitrate; styracol (guaiacol cinnamate); sulphonal; synthalin; terbium oxide, thulium oxide; urea (carbamide); vanadium-silica compounds specially prepared for use as catalysts for sulphuric acid manufacture; ytterbium oxide, yttrium oxide.

Section 10 (5) of the Finance Act, 1926, is as follows:—"The Treasury may by order exempt from the duty imposed by section one of the Safeguarding of Industries Act, 1921, as amended by this Act, for such period as may be specified in the order, any article in respect of which the Board of Trade are satisfied on a representation made by a consumer of that article that the article is not made in any part of His Majesty's Dominions in quantities which are substantial having regard to the consumption of that article for the time being in the United Kingdom, and that there is no reasonable probability that the article will within a reasonable period be made in His Majesty's Dominions in such substantial quantities."

Communications on the subject should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, within one month from September 14.

United States By-Product Sulphuric Acid

THE output of by-product sulphuric acid at copper and zinc plants in the United States in 1931, in terms of 60° acid, amounted to 862,729 short tons, of which 436,111 tons was produced at copper plants and 426,618 tons at zinc plants. At zinc plants, 100,956 tons of sulphur was used to supplement the gases derived from the roasting of zinc blende, and 381,216 tons of sulphuric acid was produced therefrom. No sulphur was used at copper plants. In 1930, 1,188,316 tons of by-product sulphuric acid was produced. Of this amount, 651,702 tons was recovered at copper plants and 536,614 tons at zinc plants. Sulphur amounting to 125,740 tons was used at zinc plants for the recovery of 474,092 tons of sulphuric acid.

News from the Allied Industries

Mineral Oil

THE SPIES PETROLEUM CO., LTD., has entered into a provisional agreement with the Service Petroleum Co., Ltd., whereby Romano-Africana Societate Anonima Romano (the subsidiary of the Service Co.) and Sondrum Societate Petrolifera Anonima Romana (the subsidiary of Hamilton's Oil Concession, Roumania, Ltd., in which the Spies Co. is interested), are to be amalgamated. The Spies Co. is to create £500,000 unsecured 6½ per cent. cumulative income debentures (convertible at the holder's option between 1937 and 1950 into Ordinary shares), and is to sub-divide 5,000,000 of the unissued 2s. ordinary shares into 1s. shares. It will then acquire from Hamilton's the whole of the capital of Sondrum, together with the amounts owing by Sondrum to Hamilton's (amounting to nearly £114,000), in consideration of £36,603 in shares and the release of Hamilton's from all liability to the Spies Co. in respect of the debentures held and debts, amounting to £53,600. It will also acquire from the Service Co. the capital of Romano-Africa for £591,394, payable in £225,000 of the new debentures and the balance in 1s. shares. The Spies Co. is also to acquire the Xenia refinery of Romano-Africana for £200,000 in cash, but if the refinery results do not come up to anticipations, the purchase price payable for the capital of Romano-Africana will be reduced by £73,279.

Iron and Steel

THE RECONSTRUCTION SCHEME foreshadowed in recent reports of the Ebbw Vale Steel, Iron and Coal Co., Ltd., has now been formulated. It provides for a modification of the rights of the debenture and noteholders, and a reduction in the capital from £3,700,000 to £425,000. The 6 per cent. debenture-holders are asked to agree to a halving of the interest up to 1937 and a waiving of the sinking fund during this period. It is also proposed to allow the company to create a further £23,000 of debentures and 3 per cent. prior lien debenture stock to an amount not exceeding £202,000. In return the company agrees to pay no dividend on any of the capital for five yars and the operation of the sinking fund for the debentures from 1937 is to provide for redemption at maturity in 1954. If these plans are approved, the bank will reduce interest payable on advances to the group to 3 per cent. for five years and will provide the £75,000 in cash which has to be paid to the Inland Revenue authorities against the security of £75,000 of prior lien debenture stock. If additional finance beyond £766,000 is required from the bank and the bank is willing to provide it, then the company is to give the bank prior lien debenture stock for such advances. Preference shareholders are asked to agree to the cancellation of 15s. per £1 share, together with all arrears of interest. The ordinary shares are to be reduced from £1 to 1s., and for five years carry no right to dividends. The report of the company for the year to March 31 has also been issued: this shows a total loss, after interest, of £308,266, against £317,491 in the previous year, increasing the debit forward to £2,137,108.

ALTHOUGH THE VOLUME OF BUSINESS in the iron and steel markets is still much below normal, more active conditions rule than for several months past. There has been a certain amount of forward buying in pig-iron, though for the most part transactions relate to small tonnages for early delivery. The competition of imported Continental iron, however, has practically ceased, and stocks in this country are being reduced. Conditions in semi-finished steel are rather quieter, but the recent advances in the price of Continental material have been held, and this has placed the British works on a more competitive footing, with the result that a fair amount of business has been taken by them. According to the National Federation of Iron and Steel Manufacturers, there were 57 furnaces in blast at the end of August, a net increase of one since the beginning of the month; two furnaces having commenced operations and one having been blown out. Production of pig-iron in August amounted to 259,400 tons, compared with 292,600 in July and 275,700 tons in August, 1931.

IT was announced at a meeting of the Barrow Hæmatite Steel Co., Ltd., on September 2, that the company had concluded with the London, Midland, and Scottish Railway a contract for the purchase of the goodwill of the steel works at Crewe, in which the United Steel Companies was asked to participate. Under this contract, the greater proportion of steel materials rolled by the railway company at Crewe would for the next ten years be rolled by Barrow and the United Steel Companies.

Sugar

THE NET PROFIT of the Irish Sugar Manufacturing Company for the year ended June 30, after charging £15,000 for depreciation, amounted to £16,990, which compares with a loss of £12,639 for 1930-31, when £40,000 was allowed for depreciation. The directors propose to transfer £23,000 from reserve and to pay a dividend of 10 per cent., tax free, on the "A" and "B" shares (the same). This will leave £42 to be carried forward (against £52). The quantity of beet worked during 1931-32 was very greatly reduced compared with previous years owing to a disagreement with the Beet Growers' Association.

Tanning Industry

TWO MORE LEATHER MANUFACTURERS in the county of Northampton have commenced chrome tanning. These are interested in the production of side leathers tanned by the one-bath process. This is quite a new line in the case of Perkins, Ltd., Irthlingborough, but in the other firm it is a revival of a business which was discontinued some few years ago. The production of chrome leather has also been revived and extended in three tanneries in the south-west of England. The application of nitro-cellulose finishes to the manufacture of hard grain or morocco goat leathers has now become a recognised method owing to the demands of the fancy leather goods manufacture. Special products of this type (nitro-cellulose) are being made in at least five factories in this country, but there is still scope for the solvent and diluent producers. G. Barker and Sons, Northampton, are extending their works to cope with the liming and wet work necessary in the preparation of chrome calf and in the tanning of reptile leathers.

Pottery Trades

THERE IS GREAT DISSATISFACTION amongst manufacturers in the Potteries at the delay of the Import Duties Advisory Committee in arriving at a decision regarding the duties on foreign pottery. More than four months ago the pottery duties were reduced from 50 per cent. to 20 per cent. A strong and immediate protest was made by manufacturers, and several representations have been made since, but in spite of this nothing has been done. The reduction in the duties has led to increased imports of foreign pottery and loss of trade to manufacturers in the home market. The North Staffordshire Chamber of Commerce, through its president, Colonel W. J. Kent, has therefore sent the following telegram yesterday to the Import Duties Advisory Committee:—"Council of North Staffordshire Chamber of Commerce at meeting to-day instructed me to urge upon you the imperative need for an immediate favourable decision by your Committee on the pottery trade's application for increased duties on imported pottery. Delay in imposing increased duties seriously impeding revival of industry and causing continuance of unemployment which could be diminished by effective duties. Obvious from official returns that present duties are inadequate, and this Chamber strongly supports the applications of the pottery manufacturers Federation."

DAMAGE AMOUNTING TO SEVERAL THOUSANDS OF POUNDS was caused by a fire at the pottery of Wedgwood and Co., Ltd., Tunstall, Stoke-on-Trent, on September 12. A kiln and decoration shop were completely destroyed, and the lithographic and several other departments were considerably damaged. The fire started in the heart of the works, and three fire engines of the Stoke-on-Trent Fire Brigade were occupied for several hours before the outbreak was under control. The firm employs over seven hundred workpeople, all of whom have been temporarily suspended, although it is hoped to restart some of the operatives in a few days.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

The following notes on the chemical market conditions in Great Britain are based on direct information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to THE CHEMICAL AGE by R. W. Greeff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

THE London chemical market remains firm. Prices generally are unchanged, but with a tendency towards higher levels. The market for coal tar products remains unchanged, but owing to the increase of 3d. per gal. in the price of petrol, the prices of motor benzol, solvent naphtha and heavy naphtha are certain to be increased. The price changes, however, had not been announced at the time of going to press. Prospects of an early settlement of the Lancashire cotton trade dispute have brightened and Manchester chemical trade interests are hopeful that a resumption of work at the mills will be effected in time to avoid any serious interference with operations at the bleaching and dyeing establishments. Except in a very limited number of products quotations on the market this week have maintained a steady appearance. New business has not been on an extensive scale but, on the whole, deliveries into consumption of many of the principal lines have not been unsatisfactory. There are no outstanding changes in the Scottish market. Business is fairly steady, but quantities are small. Prices generally remain unchanged.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £37 5s. to £39 5s.; pure 80% £38 5s. to £40 5s.; tech., 40%, £19 15s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. SCOTLAND: Glacial 98/100%, £48 to £50; pure 80%, £38 5s.; tech. 80%, £37 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in one-ton lots upwards.

ACID, CHROMIC.—11d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—1s. 0½d. per lb. LONDON: 11½d. less 5%. MANCHESTER: 11d.

ACID, CRESYLIC.—97/99%, 1s. 5d. to 1s. 7d. per gal.; 99/100%, 1s. 9d. to 2s.

ACID FORMIC.—London: £48 per ton.

ACID, HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s per ton; 50% by weight, £28 10s.; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £220 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £45 10s. per ton in casks, £48 10s. to £52 10s. in kegs. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £46, ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations: 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—11½d. per lb. SCOTLAND: B.P. crystals, 1s. 1d. to 1s. 1½d., less 5%, carriage paid. MANCHESTER: 11d.

ALUM.—SCOTLAND: Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON: £8 5s. to £9 10s. per ton. SCOTLAND: £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb. d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £36 per ton; powdered, £38, in 5-cwt. casks d/d U.K. stations or f.o.b. U.K. ports.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £19 to £20. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £22 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 4d. to 1s. 6d. per lb. according to quality.

ARSENIC.—LONDON: £24 10s. c.i.f. main U.K. ports for imported material; Cornish, nominal, £26 f.o.r. mines. SCOTLAND: White powdered £27 ex wharf; spot, £27 10s. ex store. MANCHESTER: White powdered Cornish, £25 at mines.

ARSENIC SULPHIDE.—Yellow 1s. 6d. to 1s. 8d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BISULPHITE OF LIME.—£7 10s. per ton f.o.r. London, packages free.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 15s. in 5/6 cwt. casks.

BORAX, COMMERCIAL.—Granulated £15 10s. per ton, power £17, packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—3s. 4d. to 3s. 7d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot £5 5s. to £5 15s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—4½d. to 5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£45 to £55 per ton, drums extra.

CHROMIUM OXIDE.—10d. to 10½d. per lb. according to quantity d/d U.K. Green 1s. 2d. per lb.

CHROMETAN.—Crystals 3¾d. per lb. Liquor £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r, or ex works.

CREAM OF TARTAR.—LONDON: £4 5s. per cwt.

FORMALDEHYDE.—LONDON: £28 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£46 to £50 per ton.

LEAD, ACETATE.—LONDON: White, £34 per ton. Brown £1 per ton less. SCOTLAND: White Crystals £40 to £41 c.i.f. U.K. ports. Brown, £1 per ton less. MANCHESTER: White, £33. Brown, £32.

LEAD NITRATE.—£28 per ton. MANCHESTER: £28.

LEAD, RED.—SCOTLAND: £28 10s. per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £40 per ton carriage paid.

LITHOPONE.—30%, £19 to £21 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial 1s. 8d. to 2s. 3d. gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£52 per ton d/d.

NICKEL SULPHATE.—£52 per ton d/d.

PHENOL.—Small lots 6¼d. to 6½d. per lb. in 3-cwt. drums, bulk quantities down to 5½d. per lb., delivery free U.K.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £39 to £40.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5¾d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CARBONATE.—SCOTLAND: 96/98% spot £28 per ton ex store. LONDON: £31 10s. to £32. MANCHESTER: £30.

POTASSIUM CHLORATE.—3¾d. per lb. ex wharf London in 1-cwt. kegs. LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100% powder, £34. MANCHESTER: £37.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £28 per ton c.i.f. U.K. ports. Spot £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8½d. per lb. SCOTLAND: B.P. crystals, 8½d. MANCHESTER: Commercial, 8½d.; B.P., 9d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 9d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8¼d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £6 per ton f.o.r in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot, £14 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums £18 15s. in casks. Solid 76/77% £14 10s. in drums 70/72% £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £12 15s. to £14 10s. contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£21 to £22 per ton.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous 5d. per lb. LONDON: 4d. per lb. with discounts for quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. less 1 to 3½% contracts, 4d. spot lots.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d/ 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—2¾d. per lb. LONDON: £29 per ton. MANCHESTER: £29 10s.
SODIUM CHROMATE.—3⅝d. per lb. d/d U.K.
SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals £15 ex station 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.
SODIUM NITRITE.—Spot, £19 to £22 per ton d/d station in drums.
SODIUM PERBORATE.—LONDON: 10d. per lb.
SODIUM PHOSPHATE.—£13 to £15 per ton.
SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 5d. to 6d.
SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground Spot £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d.
SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums. Crystals Spot £7 15s. per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11 10s.; commercial, £8.
SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot £9 10s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER: £17 to £17 10s. per ton f.o.b
SULPHUR.—£12 per ton. SCOTLAND: Flowers, £12 10s.; roll, £12; rock, £9. Ground American, £12 ex store.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 4s. 6d. to 4s. 11d. per lb.
ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON and SCOTLAND: £12 per ton.
ZINC SULPHIDE.—1s. to 1s. 2d. per lb.

Pharmaceutical and Fine Chemicals

ACID, CITRIC.—10½d. per lb.
ACID, TARTARIC.—11d. per lb.
BISMUTH SALTS.—Carbonate, 6s. 6d. per lb.; citrate, 8s. 10d.; nitrate (cryst.), 4s. 4d.; oxide, 10s.; salicylate, 7s. 3d.; subchloride, 9s. 10d.; subgallate, 6s. 11d.; subnitrate, 5s. 8d.
POTASSIUM CITRATE.—1s. 6d. per lb.
POTASSIUM BITARTRATE, 99/100% (Cream of Tartar).—£4 5s. per cwt.
SODIUM CITRATE, B.P.C. 1911.—1s. 3d. per lb.; B.P.C. 1923 and U.S.P., 1s 7d per lb.

Essential Oils

ALMOND, FOREIGN, S.P.A.—11s. 6d. per lb.
ANISE.—2s. per lb.
BERGAMOT.—11s. per lb.
BOURBON GERANIUM.—26s. 6d. per lb.
CAMPHOR, WHITE.—£4 15s. per cwt.
CITRONELLA OIL, JAVA.—3s. 3d. per lb.
LEMON.—6s. per lb.
LEMONGRASS.—2s. 3d. per lb.
PEPPERMINT, JAPANESE.—4s. per lb.
PETITGRAIN.—5s. 6d. per lb.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:—
ACID, BENZOIC, B.P. (ex Toluol).—1s. 9½d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.
o-CRESOL 30/31° C.—£2 6s. 5d. per cwt., in 1-ton lots.
m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots.
p-CRESOL 34.5° C.—1s. 9d. per lb., in ton lots.
DICHLORANILINE.—2s. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8½d. per lb.
DINITROTOLUENE.—48/50° C., 8¼d. per lb.; 66/68° C., 9d. per lb.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
β-NAPHTHOL.—Spot, £75 per ton in 1-ton lots, d/d buyer's works.
α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—5s. 10d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 5d. per lb.; 5-cwt. lots, drums extra.
NITRONAPHTHALENE.—9d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.
m-XYLIDINE ACETATE.—3s. 6d. per lb., 100%.

Coal Tar Products

ACID, CARBOLIC (CRYSTALS).—5½d. to 6¾d. per lb. Crude, 60's 1s. 5¼d. to 1s. 6¼d. per gal. SCOTLAND: Sixties, 1s. 7d. to 1s. 8d.
ACID, CRESYLIC.—99/100, 1s. 7d. per gal.; B.P., 1s. 10d. to 2s.; Refined, 1s 8d. to 1s. 10d.; Pale, 98%, 1s. 6d. to 1s. 7d.; Dark, 1s. 3d. to 1s. 4d. LONDON: 98/100%, 1s 6d. Dark 95/97%, 1s. 4d. SCOTLAND: Pale 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.
BENZOL.—At works, crude, 8½d. to 9d. per gal. Standard motor, 1s. 3½d. to 1s. 4d.; 90%, 1s. 4d. to 1s. 5d. Pure, 1s. 7d. to 1s. 8d. LONDON: Motor, 1s. 5½d. SCOTLAND: Motors, 1s. 3½d. to 1s. 4½d.; 90%, 1s. 9½d. to 1s. 10½d.
CREOSOTE.—Standard for export, 4¾d. to 5d. nett per gal. f.o.b. for Home, 3¾d. d/d. LONDON: 3d. to 3½d. f.o.r. North; 4d. to 4½d. London. MANCHESTER: 3d. to 4d. SCOTLAND: Specification oils, 3¾d to 4¼d.; washed oil, 4d. to 4½d.; light, 3¾d. to 4¼d.; heavy, 4½d. to 5d.
NAPHTHA.—Solvent, 90/160, 1s. 4d. to 1s. 5d. per gal.; 95/160, 1s. 5d.; 90/190, 1s. 1d. to 1s. 2d. LONDON: Solvent, 1s. 1½d. to 1s. 2d.; heavy, 11d. to 1s 0½d. f.o.r. SCOTLAND: 90/160, 1s. 3d. to 1s. 3½d.; 90/190, 1s. 1d. to 1s. 2d.
NAPHTHALENE.—Purified crystals, £9 10s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 65s. to 70s.
PITCH.—87s. 6d. to 92s. 6d. per ton, f.o.b. East Coast port.
PYRIDINE.—90/140, 3s. 9d. per gal.; 90/160, 4s. to 4s. 6d.; 90/180, 2s. to 2s. 6d. SCOTLAND: 90/160%, 4s. to 5s.; 90/220%, 3s. to 4s.
REFINED COAL TAR.—SCOTLAND: 4¾d. to 5d. per gal.
TOLUOL.—90%, 2s. 1d. to 2s. 2d. per gal.; Pure, 2s. 5d. to 2s. 6d.
XYLOL.—1s. 9d. per gal.; Pure, 1s. 11d.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 10s. per ton. Grey, £10 10s. to £12. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER: Brown, £8 10s.; grey, £11 10s.
ACETIC ACID, TECHNICAL, 40%.—£16 10s. to £18 10s. per ton.
AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.
CHARCOAL.—£6 10s. to £11 per ton.
WOOD CREOSOTE.—6d. to 2s. per gal., unrefined.
WOOD NAPHTHA, MISCIBLE.—2s. 6d. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.
WOOD TAR.—£2 to £6 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—The export price remains steady at £4 10.s per ton for prompt shipment f.o.b. U.K. port in single bags. It is expected that the price will advance as the consuming season draws nearer. The home price continues unchanged at £5 5s. per ton delivered in 6-ton lots. A large tonnage has been sold for delivery later in the year.
NITRATE OF SODA.—The price remains unchanged at £8 8s. per ton for September delivery advancing by steps to £8 16s. for spring delivery. Sales up to the present in the United Kingdom have been small. An effort is being made to make sales in Continental countries where consumption fell heavily last year.
NITRO-CHALK.—The price remains unchanged at £7 5s. per ton for 6-ton lots for delivery up to June, 1933. Purchases of small quantities have been made for delivery in the spring.

Latest Oil Prices

LONDON, September 14.—LINSEED OIL was steady. Spot, small small quantities, £20 5s.; Sept., £17 10s.; Oct.-Dec., £17 17s. 6d.; Jan.-April, £18 17s. 6d.; May-Aug., £19 17s. 6d. naked. RAPE OIL was steady. Crude extracted, £29; technical refined, £31, naked, ex wharf. COTTON OIL was firm. Egyptian crude, £23 10s.; refined common edible, £26 10s.; deodorised, £28 10s., naked, ex mill. TURPENTINE was steady. American, spot, 63s. per cwt.
HULL.—LINSEED OIL, spot, closed at £18 per ton; Sept., £17 10s.; Oct.-Dec., £17 15s.; Jan.-April, £18 12s. 6d.; May-August, £19 12s. 6d. COTTON OIL, Egyptian, crude, spot, £23 15s.; edible, refined, spot, £26; technical, spot, £26; deodorised £27, naked. PALM KERNEL OIL, crude, f.m.q., spot, £22 10s., naked. GROUNDNUT OIL, crushed/extracted, spot, £32; deodorised, £36. RAPE OIL, crushed/extracted, spot, £28 10s.; refined, £30. SOYA OIL, crushed/extracted, spot, £24 10s.; deodorised, £27 10s. per ton. COD OIL, 15s. 6d. per cwt. CASTOR OIL, pharmacy, spot, 42s.; first, 37s.; second, 32s. per cwt. TURPENTINE, American, spot, 65s. per cwt.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications Accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Silica Base for Catalysts

CATALYSTS for the production of acetic anhydride from acetic acid are made by treating asbestos or like silicate such as leucite or analeine with acid so as to leave a skeleton of silica. The silica skeleton may be used as a support for other catalysts such as metals or charcoal which thereby acquire the same advantageous surface formation as the silica. In an example, serpentine asbestos or chrysotile is treated with hydrochloric acid so as to remove all the iron and all or most of the magnesia; the asbestos may be first woven into net or cloth, or, if it is to be used in the form of pressed sheets or plates or the like, the acid treatment may be effected after the formation of the sheets. Platinum or carbon may be deposited on the silica skeleton. In the case of carbon, the silica may be impregnated with sugar solution, and ignited with exclusion of air. (See Specification No. 369,283, of R. E. Ellis.)

Desulphurising Treatment for Oils

OILS for electrical insulation or for motor spirit are desulphurised by treatment with metals such as mercury, lead, copper, amalgams of lead, copper and brass or their oxides or other compounds. The oil may be forced through a layer of amalgam of metal turnings by inert gas pressure, or may be filtered through asbestos, fuller's earth or silica gel containing metals, amalgams, or metal oxides or compounds in fine division. The vapours of metals, more especially mercury vapours, may be passed through the oil to be purified during cooling, or the oil is distilled over metal amalgam or compounds. The purification is carried out at a low temperature, preferably below 80° C. and out of contact with oxygen. (See Specification No. 368,882, of E. Moss-Graber.)

Coating Processes

PAPER articles such as containers and bottles are treated with an emulsion of latex of rubber, guttapercha, or balata and then with a waxlike substance or substances, either molten, or in solution, suspension or emulsion, in order to form a waterproof layer or coating thereon. Paper, for instance, is treated with a rubber latex having a rubber content of 40 per cent. The coating formed is partially dried, and the paper treated with a mineral or vegetable wax, either molten, dissolved or emulsified. The paper is then heated to a temperature equal to or exceeding the melting point of the wax. The latter dissolves in the rubber layer, forming an elastic, non-tacky and impervious coating. The paper or article should preferably be sized or of such porosity that as little as possible of the latex penetrates into the paper; articles may be pre-impregnated with casein, glue or gelatin or gum acacia to minimise the penetration. (See Specification No. 365,466, of H. J. Prins.)

Purification of Vitamin D.

ANTIRACHITIC preparations obtained by the irradiation of ergosterol are purified by causing their inactive components to form double compounds with maleic or citraconic acid anhydrides and separating these compounds by their insolubility in suitable solvents, for example, petroleum ether. The irradiated ergosterol is dissolved in an organic solvent, for example, benzene or a mixture of ether and petroleum ether, a slight excess of maleic or citraconic acid anhydride is added at normal or slightly elevated temperature, and the mixture allowed to stand until the double compound is formed. The solvent is evaporated, the residue containing the addition compound dissolved in alcoholic potash, the solution heated after adding water, and repeatedly extracted with petroleum ether, or successively with ether and petroleum ether. The extracts contain the active component, from which the petroleum ether is then removed by evaporation. The residue may subsequently be dissolved in a vegetable oil, or may be recrystallised from methyl alcohol or acetone. Oxygen is excluded during the process. (See Specification No. 370,743, of I. G. Farbenindustrie.)

Specifications Accepted with Dates of Applications

MANUFACTURE AND PRODUCTION OF POLYMERISATION PRODUCTS OF VINYL ETHERS. J. Y. Johnson (*I. G. Farbenindustrie*). May 30, 1931. 379,674.

THERAPEUTIC COMPOUNDS CONTAINING SILVER. W. W. Triggs (*Von Windler Laboratories, Inc.*). May 30, 1931. 379,677.

MANUFACTURE OF VINYL ESTERS. E. I. Du Pont de Nemours and Co. June 3, 1930. 379,705.

PROCESS OF MANUFACTURING THIAZOLE DERIVATIVES. Rubber Service Laboratories Co. June 21, 1930. 379,709.

MANUFACTURE OF HORN-LIKE MATERIAL FROM CASEIN. Imperial Chemical Industries, Ltd., and R. Greenhalgh. June 4, 1931. 379,739.

PRESERVATION OF OXIDISABLE ORGANIC COMPOUNDS. Imperial Chemical Industries, Ltd., H. M. Bunbury, K. W. Palmer, and W. J. S. Naunton. June 4, 1931. 379,740.

MANUFACTURE OF CHLORINATED AND BROMINATED ALKOXYANILINES. Imperial Chemical Industries, Ltd., R. F. Goldstein, and W. A. Sexton. June 4, 1931. 379,741.

DYEING PROCESS. Imperial Chemical Industries, Ltd., and M. Wyler. June 4, 1931. 379,742.

CEMENTATION OF IRON AND STEEL AND THEIR ALLOYS. Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. June 7, 1930. 379,752.

PRODUCTION OF IRON OXIDE PIGMENTS. E. I. Du Pont de Nemours and Co., J. B. Castner and R. W. Powers. June 5, 1931. 379,756.

PROCESS OF CRACKING MINERAL OIL. L. Mellersh-Jackson (*Sun Oil Co.*). June 5, 1931. 379,759.

PROCESS FOR PRODUCING HARD SOAPS. F. W. Leffer. June 5, 1931. 379,760.

MANUFACTURE OF ARTIFICIAL THREADS FROM VISCOSE. W. W. Groves. (*I. G. Farbenindustrie*). June 22, 1931. 379,791.

MANUFACTURE OF CONDENSATION PRODUCTS OF THE ANTHRAQUINONE SERIES. A. Carpmael (*I. G. Farbenindustrie*). June 26, 1931. 379,798.

SIMULTANEOUS DEVELOPMENT TO DIFFERENT GRADATIONS OF SEVERAL SILVER HALIDE EMULSION LAYERS APPLIED ON DIFFERENT SUPPORTS. W. W. Groves (*I. G. Farbenindustrie*). July 21, 1931. 379,820.

PROCESS AND APPARATUS FOR THE PRODUCTION OF ZINC WHITE. E. Feuer and P. Kemp. Oct. 13, 1930. 379,855.

MANUFACTURE OF 2 : 3 AMINO-NAPHTHOL AND DERIVATIVES THEREOF. I. G. Farbenindustrie and A. G. Bloxam. Sept. 8, 1931. 379,862.

DYEING WITH VAT-DYESTUFFS. Society of Chemical Industry in Basle. Dec. 30, 1930. 379,948.

METHOD FOR THE PREPARATION OF BRIQUETTES FOR INTRODUCING MANGANESE AND SILICON IN CUPOLA CASTINGS. H. Frauenknecht. March 7, 1932. 379,994.

PROCESS FOR THE MANUFACTURE OF NITRATE OF LIME IN GLOBULAR FORM. Norsk Hydro-Elektrisk Kvaelstofaktieselskab. Feb. 22, 1932. 380,007.

MANUFACTURE OF INDIGOID VAT-DYESTUFFS. Society of Chemical Industry in Basle. Aug. 10, 1931. 380,020.

Complete Specifications open to Public Inspection

MANUFACTURE OF ORGANIC METALLIC COMPOUNDS. F. O. Rice. Aug. 31, 1931. 15766/32.

PROCESS FOR THE PRODUCTION OF ALLOYS OF BERYLLIUM WITH HEAVY METALS. I. G. Farbenindustrie. Sept. 5, 1931. 20896/32.

MANUFACTURE OF ANHYDROUS ALKALI POLYSULPHIDES. I. G. Farbenindustrie. Sept. 5, 1931. 21076/32.

PROCESS FOR THE DEPHOSPHORISING OF STEEL. Society d'Electro-Chimie D'Electro-Metallurgie et des Acieries Electriques D'Ugine. Aug. 31, 1931. 21469/32.

PREPARATION OF AROMATIC SULPHIDE COMPOUNDS. Naugatuck Chemical Co. Sept. 5, 1931. 22200/32.

PROCESS OF PRODUCING PURE HYDROGEN FLUORIDE. I. G. Farbenindustrie. Sept. 2, 1931. 24311/32.

PRODUCTION OF BLEACHING CLAYS FROM NATURAL SILICATES. Bayerische Akt.-Ges. fur Chemische und Landwirtschaftlich-Chemische Fabrikate. Sept. 3, 1931. 24632/32.

THERAPEUTICALLY-VALUABLE DERIVATIVE OF ETHYLHYDROCUPREINE, AND PROCESS FOR ITS MANUFACTURE. Laboratori Miochimici Soc. Anon. Sept. 4, 1931. 24760/32.

Applications for Patents

PRODUCTION OF BASE-EXCHANGING WATER-SOFTENING SUBSTANCES. Aktiebolaget Filtrum. Sept. 5. 24742.

DESTRUCTIVE HYDROGENATION OF DISTILLABLE CARBONACEOUS MATERIALS. J. J. V. Armstrong (*International Hydrogenation Patents Co.*). Sept. 8. 25012, 25013.

APPARATUS FOR PURIFYING, ETC., OILS. G. R. Dugdale. Sept. 10. 25258.

COATING COMPOSITIONS. E. I. Du Pont de Nemours and Co. Sept. 7. (United States, Sept. 8, '31.) 24932.

PRODUCTION OF BENZENE HOMOLOGUES. C. C. Hall. Sept. 5. 24751.

PRODUCTION OF COLOURING MATTERS. I. M. Heilbron, Imperial Chemical Industries, Ltd., and F. Irving. Sept. 6. 24856.

1-PHENYL-3-METHYL-4-ALKYL-AND-4-ARAYKYL-PYRAZOLOES. F. Hoffmann-La Roche and Co. Akt.-Ges. Sept. 6. (Germany, Sept. 7, '31.) 24815.

NITROGENISATION OF CAST-IRON ALLOYS. J. E. Hurst and Nitricast-iron Co., Ltd. Sept. 9. 25167.

MANUFACTURE OF ALIPHATIC AMINO ACIDS, ETC. J. Y. Johnson (*I. G. Farbenindustrie*). Sept. 5. 24701.

MANUFACTURE OF DYES. I. G. Farbenindustrie. Sept. 9. (Germany, Sept. 9, '31.) 25196.

MANUFACTURE OF AZO DYESTUFFS. I. G. Farbenindustrie. Sept. 9. (Germany, Sept. 10, '31.) 25201.

MANUFACTURE OF ASSISTANTS FOR PAINT, ETC., INDUSTRIES. Imperial Chemical Industries, Ltd. Sept. 5. 24702.

PLASTIC MATERIALS. Imperial Chemical Industries, Ltd. Sept. 9. 25177.

CONCENTRATION OF ORES BY FLOTATION. International Nickel Co. of Canada, Ltd. Sept. 5. (United States, Sept. 23, '31.) 24757.

THERAPEUTICALLY-VALUABLE DERIVATIVE OF ETHYLHYDROCUPREINE. Laboratori Biochimici Soc. Anon. Sept. 5. (Germany, Sept. 4, '31.) 24760.

PRODUCTION OF HORMONES. Laboratoires Français de Chimiothérapie. Sept. 8. 25057.

TREATMENT OF SEEDS. Oesterreichische Chemische Werke Ges. Sept. 5. (Austria, Sept. 21, '31.) 24699.

CLARIFICATION OF LIQUIDS. J. E. Pollak (*Chemische Werke Marenfelgde Akt.-Ges.*). Sept. 5. 24740.

WATERPROOFING EMULSIONS. Powell Duffryn Steam Coal Co., Ltd. Sept. 9. 25213.

PRODUCING COMPOSITIONS OF FUEL OIL AND POWDERED COAL. Radiochemisches Forschungs Institut Ges. Sept. 9. (Germany, Oct. 10, '31.) 25192.

MIXING AND HEAPING COMPOUND CHEMICAL MANURES. G. M. Tyler. Sept. 5. 24709.

HYDROGENATION OF CARBONACEOUS MATERIALS. F. Uhde. Sept. 5. (Germany, Sept. 8, '31.) 24725.

From Week to Week

RUTHS INTERNATIONAL ACCUMULATORS, LTD., announces that Lieut.-Com. J. M. Kenworthy has been elected a director.

IT IS UNDERSTOOD that a foreign firm of transparent paper makers are to take over the Nuera Silk works at St. Helen's Junction for an extension of their business.

RRPRESENTATIVES OF THE UNITED STATES OIL COMPANIES have petitioned the United States Treasury to apply a 2½ per cent. tariff on naphtha imports, claiming that the importations from Russia are threatening to disrupt the home industry.

RECENT WILLS include :—Mr. Percival Montague Watts, of Sidcup, Kent, founder and governing director of Watts, Fincham and Co., Ltd., metal merchants, of 22 Billiter Street, E.C., and a director of International Paint and Compositions, Ltd., and Scammell Lorries, Ltd., £83,901.

THE IRISH FREE STATE GOVERNMENT is interesting itself in the possibilities of establishing an artificial silk factory in that country. At the same time research is being made into the use of seaweed for the production of artificial silk. Initial trials are understood to have proved very satisfactory and larger experiments are to take place.

A FRENCH TECHNICAL JOURNAL announces that soap can be made from locusts, which are one of the plagues of North Africa. The locusts are dried in the sun and then treated with carbon disulphide or ethyl chloride, according to their degree of dryness. The oil thus obtained is then purified by steam and used for making soap.

THE I. G. FARBENINDUSTRIE, Imperial Chemical Industries, and the Norge combines have come to an agreement with the Dutch Sluiskill nitrogen works (which are backed by Montecatini and by Coppée of Brussels and their banks), under which Suiskill will limit their annual production to 15,000 tons, only a fraction of their capacity. In return Sluiskill are to receive an annual redemption payment of some 4,500,000 marks, which will suffice for the writing off of depreciation and for a moderate dividend.

IMPERIAL CHEMICAL INDUSTRIES, LTD., announce that they have released Sir Frederick Keeble, F.R.S., from executive and routine duties as controller of the agricultural research station at Jealott's Hill, in order that he may be more free to devote himself to the many important problems now arising in connection with the application of scientific results to modern agriculture. Sir Frederick remains a member of the I.C.I. research council, and will continue to serve the company in an advisory capacity.

COURSES IN THE BIO-CHEMISTRY OF FERMENTATION (including malting and brewing) have been arranged for the forthcoming session at the Sir John Cass Technical Institute, Aldgate, E.C.3. These courses of instruction are specially designed for those engaged in the practical and scientific control of maltings, breweries, and other fermentation industries who desire to acquire a knowledge of the technology and principles underlying their daily operations. The laboratory instruction will comprise the chemical and biological methods employed in scientific control. Further particulars can be obtained on application to the Institute.

IT HAS BEEN OFFICIALLY ANNOUNCED by the national petrol distributors that the price of all grades of petrol would be increased as from September 14, by 3d. per gallon in Britain, a similar rise taking place in Northern Ireland. An increase in the price had been generally anticipated, but the view held in the trade had been that the advance would have been not more than 2d. per gallon, with the possibility of a further increase of 2d. later. Until this change the price of No. 1 petrol sold by the combine had been 1s. 4½d. per gallon, at which price it had remained since September of last year. Of this amount 8d. went to the Treasury in taxation and 2d. to the retailer. The price of No. 1 petrol sold by non-combine firms had averaged 1s. 2½d. per gallon.

THE INTERNATIONAL OIL CONFERENCE is to be resumed in Paris about October 15.

MR. LLOYD WILLEY, of Thomas Hill-Jones, Ltd., has kindly offered to present two silver challenge cups for next year's Chemical Industry Lawn Tennis Tournament, one from himself and one from his firm, the latter to be called the "Invicta" Challenge Cup.

IN HIS PRESIDENTIAL ADDRESS to the North British Association of Gas Engineers, at Ayr, Mr. T. W. Harper declared that the means of revitalising the coal industry lay with the gas industry and the coke oven industry.

IN THE MANCHESTER CHANCERY COURT on September 13 the Deputy of the Chancellor (Mr. H. Winstanley) had before him a creditor's petition for the winding-up of the Elton Cup Dyeing Company, Ltd. By consent the petition was adjourned to October 13.

A MEETING OF THE CREDITORS of J. Dalby and Co. (Blossom), Ltd., soap makers and lanoline manufacturers, of Undercliffe, was held in Bradford on September 7, when the firm had decided to go into voluntary liquidation. Mr. Joseph Rhodes (Rhodes, Stringer and Co., incorporated accountants) was appointed liquidator.

IN CONNEMARA, IRELAND, a demonstration of the use of locally-made dyes recently attracted considerable attention. The Irish Free State Government are endeavouring to encourage the manufacture of vegetable and other dyes and extensive research work is being carried out in this direction.

DR. HAROLD MOORE, who has for many years been Director of Metallurgical Research at the Research Department, Woolwich, has been appointed Director of the British Non-Ferrous Metals Research Association, as from October 1, 1932. In this new post he succeeds Dr. R. S. Hutton, who has been elected to the new Goldsmiths Professorship of Metallurgy at Cambridge University.

THE LONDON AND NORTH EASTERN RAILWAY has placed in service a number of specially-constructed insulated containers for the quick distribution of solid carbon dioxide ("dry ice") which is now being used for all kinds of refrigerating purposes. These containers will carry two tons of "dry ice" at a time from the Billingham works of I.C.I., Ltd., to all parts of the country, and insulated storage accommodation is also being provided at the L.N.E.R. depots at Marylebone, Hunslet (Leeds), Nottingham, and Manchester.

THE CAPE ASBESTOS CO., LTD., has secured one of the largest lagging contracts ever placed in this country, in connection with the new super electric power station at Barking. This order has been secured against intensive competition and is a tribute to the efficiency of the new "Caposit" material which this company has recently put on the market. The "Caposit" lagging is manufactured entirely from amosite asbestos produced from the company's mines in the Transvaal, South Africa.

THE DIRECTORS OF IMPERIAL CHEMICAL INDUSTRIES, LTD., after reviewing the net income for the six months ended June 30, 1932, have declared an interim dividend as at October 15, 1932, in respect of the trading year ending December 31, 1932, of 2½ per cent. actual on the issued ordinary capital of the company. This dividend will be payable (less income tax at 4s. 9½d. in the pound, being United Kingdom income tax at five shillings in the pound less Dominion income tax relief at 2½d. in the pound) on December 1, 1932, to shareholders on the register on October 15, 1932. For the purpose of the payment of this dividend transfers are to be lodged at the company's registered office not later than October 14, 1932.

Obituary

DAVID LLEWELLIN-EVANS, partner in the firm of Llewellin-Evans and Major, a subsidiary of Imperial Chemical Industries, Ltd., at Penarth, near Cardiff, aged 76.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

CUPROFERRUM ANGLO-CONTINENTAL MINING CO., LTD., London, W.C. (M. 17/9/32.) Registered September 2, series of £80,000 (not ex.), debs., present issue £10; general charge.

ORFORD TANNING CO., LTD. (LANCS.). (M., 17/9/32.) Registered September 3, deb., to Union Bank of Manchester, Ltd., securing all moneys due or to become due to the Bank; general charge.

UTOL, LTD., London, W., chemical manufacturers. (M., 17/9/32.) Registered August 31, £800 debs., part of £5,000; general charge. *£1,800. March 23, 1932.

New Companies Registered

David Willox, Ltd., 50 Quarry Knowe, Glasgow.—Registered in Edinburgh, September 5. Nominal capital £2,000 in £1 shares. Objects: To carry on the business of chemical manufacturers and drysalters, etc.

English Mercantile & Industrial Co., Ltd. Registered September 3. Nominal capital £100 in £1 shares. Manufacturers, exporters and importers of, agents for and dealers in industrial, chemical and other preparations and patents, etc. A subscriber: W. E. Howard, 197 North Hill, Highgate, London, N.6.

F. E. Hart & Co., Ltd. Registered September 8. Nominal capital £2,625 in 2,500 ordinary shares of £1 and 2,500 deferred shares of 1s. each. Producers, refiners, manufacturers of and dealers in petroleum and other oils (except essential oils), bitumen, asphalt, tar, tar distillates, methylated spirits, etc. A subscriber: Miss I. D. Payton, 15 Moorgate, London, E.C.2. The first directors are: W. H. Botsford and F. E. Hart.

Forthcoming Events

Sept. 22.—Optical Society. Special general meeting. Imperial College of Science and Technology.

Sept. 23-26.—Association of Special Libraries and Information Bureaux. Ninth annual conference. Somerville College, Oxford.

Company News

Thos. Firth & John Brown, Ltd.—The directors intimate that as the depressed condition of the steel industry still persists, they do not feel justified in paying any dividend on the preference shares. Dividends on the 5 per cent. (tax free), and 6 per cent. cumulative preference shares of £1 are paid to December 31, 1930.

Diamond Match Co.—The net earnings for six months ended June 30, 1932, amounted to $1,100,330 compared with $1,320,093 for the corresponding half of 1931. Dividends on common stock (50 cents per share) took $525,000, and accrued dividend on 6 per cent. preferred stock $470,325, leaving a balance at June 30 of $5,914,484, against $5,811,375 at December 31.

Chemical Trade Inquiries

Abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Canada.—A manufacturers' agent at Vancouver is prepared to represent United Kingdom manufacturers of drugs and druggists' sundries, soaps, polishes, chemicals and allied products, etc., in British Columbia. (Ref. No. 356.)

Canada.—A manufacturers' agent established at Toronto desires to secure United Kingdom agencies in cyanide hardening pots and other products for the Provinces of Quebec and Ontario. (Ref. No. 357.)

Canada.—A well-known firm of chemical importers and manufacturers' agents in Vancouver desires to obtain the representation of a United Kingdom producer of dyes suitable for the paper trade in British Columbia only. (Ref. No. 361.)

Germany.—A firm established at Dusseldorf wishes to obtain the representation of United Kingdom manufacturers of glycerine, dextrine, potato flour, gelatine, resin, oleine and similar products. (Ref. No. 375.)

British India.—A Bombay firm of general importers and manufacturers' agents is open to undertake the representation of United Kingdom manufacturers of pharmaceutical preparations, toilet requisites, etc., in Bombay Presidency, Central Provinces and Central India. (Ref. No. 348.)

Canada.—A salesman engaged in the sale of paints and builders' supplies and calling on the hardware trade in the Maritime Provinces desires to obtain United Kingdom agencies for the sale of agri-horticultural chemicals, including blue vitriol, arsenate of lead, calcium arsenate, nicotine sulphate, etc. (Ref. No. 359.)

Belgium.—A commission agent who is an Australian, established at Brussels, wishes to obtain the representation of United Kingdom manufacturers of recording thermometers, distance thermometers, pyrometers, thermostatic controls, scientific instruments and insulating materials, such as corkboard, etc. (Ref. No. 370.)

Egypt, Palestine, Syria, Cyprus, Malta and Morrocco.—A commission agent, at present in the United Kingdom, is about to conduct a tour of these markets and desires to establish connection with British manufacturers of paints, rubber goods, copper sheets, etc. (Ref. No. 382.)